LACUS FORUM XXVI

The Lexicon

University of Alberta

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INVITED LECTURE

VERBS AND THEIR OBJECTS AND THE ONE NEW IDEA HYPOTHESIS

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In chapter 9 of *Discourse, Consciousness, and Time* (Chafe 1994) I suggested what I called the 'one new idea' hypothesis, or more fully 'one new idea per focus of consciousness'. Briefly, it is the hypothesis that the human brain is constructed in such a way that under normal circumstances people are restricted to activating no more than one new idea at a time. To understand what that means, it is necessary to understand what is intended by the terms *focus of consciousness*, *idea*, *new*, and *one*. It is especially this last point—the question of what constitutes *one idea*—that is going to be the principal topic of what follows.

At the outset I need to mention that the one new idea hypothesis can be tested only by examining spontaneous spoken language. It is, in fact, extremely easy to invent examples that violate the hypothesis; for example, sentences one might well think were 'grammatical' but that contain more than one new idea in the sense to be described. The question is whether people really talk that way. This restriction to spoken language is important because writing distorts the normal flow of ideas that has, in the course of evolution, given language the shape it has. Writers do violate the one new idea constraint, which is determined by forces that come into play while people are creating language on the fly.

I have given in (1) a brief excerpt from a conversation in which the speaker was talking about some things that happened when he was in college in the 1960s, when most of the people he knew dropped out. In (1)d and (1)f the *mhms* of his interlocutor are given in italics.

(1) a ...In the síxties,
b ...almost everybody I knéw,
c ....dropped óut.
d ...*Mhm*,
e ..There were very few péople.
f ...*Mhm*,
g ..made it thróugh.

When one listens to ordinary speech like this, one notices that it is produced in the spurts or prosodic phrases I have been calling *intonation units* (Chafe 1994:53–70). They are often separated by pauses, indicated in (1) with the sequences of two, three, or four dots at the beginning of each line, depending on their relative length. They often begin louder than they end, they often begin faster and end more slowly, they may begin with a resetting of the overall pitch level, and they may exhibit a change of voice quality at the end, but their most consistent property is the presence of some kind of terminal pitch contour. Hence the appropriateness of the term intonation unit. In (1) these terminal pitch contours are shown in a rough way with punctuation, where the periods at the ends of (1)c, (1)e, and (1)g show a falling pitch that is likely to be perceived as expressing some kind of closure. The commas at the ends of (1)a, (1)b, (1)d, and (1)f show a non-falling pitch, perceived as expressing some kind of continuation.

Why is it that speech is produced in these spurts? The need to breathe must play a role, but it is certainly not the whole story. If one examines intonation units carefully, they reveal properties suggesting that they have cognitive and interactional as well as respiratory significance. It has proved fruitful to suppose that each intonation unit verbalizes a segment of content the speaker is focusing attention on at that moment (or possibly just before that moment), content that he or she would like the listener to focus on too as a result of hearing the intonation unit. From that point of view speech can be seen as verbalizing a succession of foci of consciousness, initially in the speaker's mind, but with some version of them induced in the listener's mind as a result of hearing each intonation unit. These foci of consciousness function as the fundamental building blocks of thought as it proceeds through time, at least to the extent that thought is molded by language.

That is a brief explanation of what is meant by a focus of consciousness. What, then, is an *idea*, as that term is used here? One quickly discovers that the one new idea hypothesis can be maintained only if the notion of an idea is limited to something quite specific that can be related to the familiar distinction between *content* words and *function* words. Content words belong to large open classes such as verbs and nouns, and any particular content word is likely to be low in text frequency. Function words belong to small closed classes, and some of them have much greater text frequency. Function words (as well as affixes) serve in a broad sense to *orient* and *tie together* whatever is expressed by content words. Content words and function words reflect two distinct aspects of thought, and here I will say that content words are manifestations of *ideas*, while function words (and affixes) express *orientations* of those ideas.

Ideas themselves can be subcategorized into ideas of events and states—things that happen and the way things are, plus the participants in those events and states—the people, objects, and abstractions that cause events to happen and are affected by them, and that exist in states or enter into states. I will use the term *referents* for these ideas of participants in events and states. I have summarized this terminology in (2), distinguishing ideas (events, states, and their participants) from orientations of ideas, which may involve their placement in space and time, or epistemologically, or in the ongoing interaction, or with relation to other ideas being verbalized.

(2) Major components of verbalized thought
  a. Ideas
    Events and states
    Participants in events and states ('referents')
  b. Orientations of ideas in space, time, epistemology, interaction, and the verbal context

Looking back at (1) with these distinctions in mind, one can see that in (1)a there was a focus on a temporal state, expressed as *in the sixties*. (1)b then focused on a referent, expressed as *almost everybody I knew*. (1)c placed that referent as a participant in the event of *dropping out*. (1)e introduced another referent, expressed as *very few people*. And (1)g placed that referent as a participant in the event of *making it through*. These ideas of referents, states, and events were oriented in various ways. For example, the *almost* in (1)b hedged the meaning of *everybody I knew*, and the past tense of *knew* oriented that idea in time, as did the past tense of *dropped* in (1)d, of *were* in (1)e, and of *made* in (1)g.

What, then, is meant by *new*? It has proved useful to regard a new idea as one the speaker assumes he or she is introducing into the listener's consciousness for the first time within the current conversation, activating it with the current intonation unit. Thus, (1)a activated the idea of being *in the sixties*, (1)b the idea *of almost everybody the speaker knew*, (1)c the idea of *dropping-out*, and so on. In contrast, a *given* idea is one the speaker assumes is already active in the listener's consciousness, for whatever reason. In (1)b, for example, there was the given idea of the speaker himself, expressed with the pronoun *I*. The speaker could assume that the idea of him was already active in the listener's consciousness just because he was the speaker.

With these brief explanations of what is meant by *focus of consciousness*, *idea*, and *new*, we can direct our attention to the term *one* in the one new idea hypothesis. As a first approximation it might be tempting to equate ideas simply with content words like verbs and nouns, so that if one were looking for evidence against the hypothesis one would look for intonation units in which there were, say, both a verb and a noun, each of which expressed a separate new idea.

Example (1) presents no problems here. (1)b contains both the noun *everybody* and the verb *knew*, but in terms of content we can suppose that *almost everybody I knew* expressed the idea of only one referent, which then became the participant in the event of *dropping out* in (1)c. In fact, (1) is the kind of example that gives some confidence in the hypothesis, since it predicts that cognitive limitations would force the new ideas in (1)b and (1)c to be distributed across two intonation units. The speaker could not have said *almost everybody I knew dropped out* as a single intonation unit. That may on the face of it seem difficult to accept, but in fact a great deal of ordinary speech suggests that it is true.

There are two ways in which ideas of events and states differ from ideas of their participants. First, our brains are evidently capable of activating the idea of a referent alone, without focusing on its participation in any particular event or state. This ability is reflected in language when separate foci of consciousness—expressed in separate intonation units—are devoted to a referent by itself, as in (1)b, *almost everybody I knew*. But we do not find the opposite. That is, it seems not to be possible to focus consciousness on an event or state alone, except in a few cases of ambient events like *it's raining* or ambient states like *it's cold*. Aside from those cases, the idea of an event or state cannot be present in consciousness without including one or more participants. For example, in (1)c the *dropping out* event is inconceivable without the participation of the person who dropped out. In short, ideas of referents can be focused on independently, but ideas of events and states must include participants in order to exist at all.

A second difference between ideas of events and states and ideas of their participants is that event and state ideas are usually transient in the flow of thought. They are focused on only briefly, typically in single intonation units, whereas ideas of referents often continue to be active over longer intervals. Discourse consists in large part of activating one event or state idea after another, with roughly one or two seconds devoted to each, whereas ideas of referents, once they have been activated, may persist in the active state for longer periods. In (3) one can see how the idea of the person that was activated in (3)a persisted through (3)b and (3)c, whereas (3)b focused only briefly on the idea of going, and (3)c only briefly on the idea of knowing.

(3) a ....And this gúy,
b he wént,
c ..and he knèw Lássie,

As mentioned above, the one new idea hypothesis cannot be maintained unless newness is restricted to ideas, to the exclusion of orientations. But that means that ideas of events and states and their participants can potentially all be new, independently of each other. Suppose there is an event idea that is new, as is often the case. What one often finds is a situation in which a new event includes one or more participants that are given. That is true, for example, of (3)b. The idea of the guy was first activated in a separate intonation unit in (3)a. By the time the speaker came to (3)b that idea was given and could be expressed with the unaccented pronoun *he*. In (3)b only the event idea expressed by *went* was new. But what can be said about (3)c? The same given idea of the guy was repeated, again with the pronoun *he*, but this time there was the idea of *knowing* along with the idea of *Lassie*. If knowing and Lassie were both new ideas, independent of each other, (3)c would violate the one new idea hypothesis. That is the kind of situation I will explore here, focusing on the verb-object construction. I will return to (3)c later, after discussing cases that are easier to deal with.

We can begin by looking at phrases like *have a talk*, included in (4).

(4) a ..Thése gúys,
b ...Í gotta go have a tálk with em.

(4)a activated the idea of some guys. (4)b then began and ended with pronouns that expressed given ideas. The *I* at the beginning expressed the idea of the speaker, and the *em* at the end the idea of the guys. This idea of the guys was, of course, given because it was activated in (4)a. What, then, can one say about the rest of (4)b, *gotta go have a talk with*? It is a sequence that begins with two orientations—first the deontic auxiliary *gotta*, and then the *go* that has an *andative* function, showing a change of location in order to do something. We are left with *have a talk with* expressing what needs to be interpreted as no more than one new idea if the hypothesis is going to stand up. It illustrates a construction that has often been discussed, but from very different angles.

Chapter 7 of volume 6 of Jespersen's *A Modern English Grammar* deals with what Jespersen called 'substantives from verbs without change', by which he meant deverbal nouns that have the same form as the verbs from which they are derived: nouns like *drink* or *fight*, or in this case *talk*. Regarding such nouns he wrote:

> The most usual meaning of [substantives] derived from and identical in form with a [verb] is the action or an isolated instance of the action. This is particularly frequent in such everyday combinations as those… after *have* and similar 'light' verbs. They are in accordance with the general tendency of [Modern English] to place an insignificant verb, to which the marks of person and tense are attached, before the really important idea (Jespersen 1909–49, vol. 6:117).

Jespersen mentioned other verbs of this sort in addition to *have*, including examples like:

(5) have a drink
give a sigh
take a walk
make a bow
give (someone) a kick

Hendrik Poutsma, in his *A Grammar of Late Modern English*, also wrote about this construction, describing it in a similar way:

> There is also a marked tendency in Modern English to express a verbal idea by means of a combination consisting of a verb with a vague meaning and a noun of action. The latter is then the real significant part of the predicate, while the former mainly serves the purpose of a connective (Poutsma 1914–26:394).

More recently in *A Comprehensive Grammar of the English Language* by Quirk, Greenbaum, Leech, and Svartvik, the same construction was recognized in terms of what was called an *eventive object* together with a 'common verb of general meaning':

> A frequent type of object generally takes the form of a deverbal noun preceded by a common verb of general meaning, such as *do*, *give*, *have*, *make*, *take*. The EVENTIVE object… is semantically an extension of the verb and bears the major part of the meaning. Compare:
>
> They *are arguing*. [verb only]
> They *are having an argument*. [verb + eventive object]
> (Quirk et al. 1985:750–51)

Thus, all these authors noticed a subset of English verbs that were variously called 'insignificant', 'light', 'with a vague meaning', or 'a common verb of general meaning', and that occur with object nouns that express 'the really important idea' or 'the real significant part of the predicate', or 'the major part of the meaning'. Several other linguists have elaborated on these observations in different ways. I will mention three of them.

In 1984 Ray Cattell published an entire book devoted to examples of this kind, with the title *Composite Predicates in English*. Cattell was concerned with explaining this phenomenon within the framework of Government and Binding (Chomsky 1981). He compared sentences like those in (6):

(6) a Bill kicked the dog.
b Bill gave the dog a kick. (Cattell 1984:6)

He evidently assumed that sentences like these mean more or less the same thing, and he wrestled with the problem created by the fact that in (6)a *the dog* is a patient or theme, whereas in (6)b he is a recipient or goal, not to mention the fact that *kick* appears to be a verb in (6)a but a noun in (6)b. Reconciling these observations with the 'projection principle' and the 'T-criterion' was something of a problem, whose solution by Cattell I am unable to evaluate, other than to mention that both the problem and the solution are internal to the Government and Binding framework.

A very different approach was taken by Anna Wierzbicka (1982), who concentrated almost exclusively on the semantics associated with the verb *have*, as in *have a drink*. She distinguished ten subtypes, distinguished by semantic properties of the deverbal noun, like *drink* (although in fact she interpreted *drink* as an infinitive *verb*). She suggested that all these subtypes share certain properties that are derived in part from the semantics of *have*, in part from the juxtaposition of the indefinite article with the infinitive verb. To give the flavor of these subtypes, the following are her characterizations of three of them:

> Aimless objectless individual activity which could cause one to feel good. E.g., *have a swim*.

> Action aiming at perception which could cause one to know something and which would not cause one to feel bad if it didn't. E.g., *have a taste (of)*.
>
> Joint speech activity which could cause the people involved to feel pleasure. E.g., *have a talk*. (Wierzbicka 1982:762–63, 786)

Wierzbicka's article is full of subtle semantic observations which show that the meanings associated with expressions like these are distributed in ways that are by no means simple, but she also took pains to emphasize that 'such verbal expressions, far from being idiosyncratic, exhibit highly systematic behavior, are governed by strict rules, and constitute a vital part of English grammar' (753–54).

The last reference I will mention in this connection is Adele Goldberg's book on construction grammar, where she uses this phenomenon as an example of how 'constructions themselves carry meaning, independently of the words in the sentence' (Goldberg 1995:1). Of interest here is the following statement:

> Metaphorical expressions such as *give a kick* focus attention on the action denoted by the nominal, here *a kick*. This is, in fact, what distinguishes *give a kick* from the verbal form *kick*, which can readily be used when the focus is not on the action performed… [The metaphorical extension of the ditransitive construction] can inherit the specification that the action (the metaphorical 'transferred thing') and not the recipient is the focused element (Goldberg 1995:95).

I take this to mean that *she gave John a kick* is appropriate in a situation where the speaker wants to focus attention on the kicking, whereas presumably *she kicked John* may focus attention on John. Such interpretations must in the end involve prosody, word order, givenness and newness, and discourse context, none of which Goldberg mentions, but her remarks can at least serve to redirect our attention to the point made by earlier authors who noticed that the *have* or *give* part of such examples has a 'light' meaning, while the other element, such as *kick*, expresses 'the major part of the meaning'.

How does all this relate to the one new idea hypothesis? Suppose we say that a light verb such as *have* does not itself enter into the *new* versus *given* distinction, but combines with its object to express one idea. In other words, there is only one idea that is conveyed by *have a talk*, so there is only one element that can be new. It may be useful to think of *have* as functioning as a kind of derivational element, deriving an event, *having a talk*, from a referent, *talk* (which is itself derived from the event *talk*). The important point is that *having a talk* is one idea, not two ideas expressed separately by *have* and *a talk*.

We can now take account of a different kind of observation, shifting for a moment from objects to subjects, and even to examples from written language. Jan Firbas, in *Functional Sentence Perspective in Written and Spoken Communication*

(Firbas 1992), looking at examples from literature, noticed that subjects that are new, or 'context-independent', are followed by a subset of verbs that express 'appearance or existence on the scene' (59–60). I will call them here *enabling verbs*, in the sense that they enable certain participants to exist or be present. Firbas gave examples from Galsworthy's *The Forsyte Saga*, including the two in (7).

(7) a A very sweet look had come into the old lady's face.
b A haze hovered over the prospect. (Firbas 1992:59–60)

In (7)a the idea of *a very sweet look* was new, and it was the subject of *had come into*, which functioned to present or introduce the idea of the sweet look. Firbas provided a partial list of verbs and verb phrases that function in this way, including *appear*, *arrive*, *come into view*, *commence*, *emerge*, *show up*, and so on. He mentioned that it is impossible to give an exhaustive list, because examples like (7)b suggest that the list would be open-ended. The idea of *hovering*, as a haze might hover, belongs to an open set of very particular situations.

We can ask first whether examples like those in (7) are counterexamples to the one new idea hypothesis, ignoring for a moment the fact that these examples are from literature. If the subjects in them, *a very sweet look* and *a haze*, do express new ideas, the question is whether the events expressed as *had come into* and *hovered over* are also new, independent of their subjects, so that each of these sentences contains at least two new ideas. The alternative is to regard the idea of the *haze* together with its appearance on the scene as one idea, not two.

Shifting back to speech, we can ask whether parallel examples can be found, where a subject expressing a new idea occurs in one intonation unit with an intransitive verb that has this enabling function. Perhaps (8) will serve.

(8) a ...Then one afternóon,
b ...this ván pulls in thère. (Chafe 1994:91)

In (8)b *pulls in* may qualify as an enabling verb, in the sense that it introduced the idea of *the van* and thus did not express an independent new idea. This interpretation is aided by the prosody. New ideas are always expressed with primary accents, and the idea of *pulling in* did not have such an accent. When a new subject is paired with a verb that does not have this enabling function, the two are necessarily distributed across two intonation units. We saw that in (1)b and (1)c, repeated here as (9). It would be difficult to make a case for *dropped out* being an enabling verb, and here the subject and verb seem unquestionably to express independent new ideas.

(9) a ...almost everybody I knéw,
b ....dropped óut.

Although new *subjects* are comparatively rare in spoken language, new *objects* are very common, and they provide a richer source of possible evidence against the one new idea hypothesis. We can start by looking at the examples in (10):

(10) a they hìred súmmer hèlp,
b they're pàying sèven fífty,

The ideas expressed by *summer help* in (10)a and *seven fifty* in (10)b were new. Should then the idea of *hiring* and the idea of *paying* be considered separate new ideas, or do these verbs too fit the category of enabling verbs? In favor of this interpretation is the observation that hiring involves an object that fits the category of 'help' in the sense of employees, and *paying* involves an object that is some amount of money. *Hiring* thus serves to introduce *help*, *paying* to introduce *money*.

The suggestion is that light verbs like *have* as well as enabling verbs like *pull* in in (8) and *hire* and *pay* in (10) do not express new ideas that are independent of the ideas expressed by their subjects if the verb is intransitive, or by their objects if the verb is transitive, but merge with those participants to express unitary new ideas. We can now extend this recognition of unitary ideas to include familiar collocations. There are certain events and states that are encountered so often in daily life that the words used to express them have become fixed elements in the linguistic repertoire. Examples are phrases like the following.

(11) eat breakfast
read a book
visit the dentist

When we talk about eating breakfast, for example, there is no need to activate the ideas of *eating* and of *breakfast* separately. Benson, Benson, and Ilson (1997) provide an extensive list of collocations of this sort.

In these collocations the meaning of the whole is largely derived from the meanings of its parts. But the eventual fate of some collocations can be to take on a life of their own, becoming idioms. An idiom is the final stage in the unification of an idea. In (13) there is no need to raise the question of separate ideas being expressed, for example, *by break* and *the ice*; there is clearly only one idea in each case.

(13) break the ice
hit the roof
pull a fast one

I have now described four situations in which it is plausible to suppose that a verb and its object serve to express one idea, not two separate ideas. They can be seen as falling into two major categories: low content verbs and lexicalized phrases. Low content verbs consist of light verbs such as *have* in *have a talk* and enabling verbs like *pay* in *pay seven fifty*. Lexicalized phrases consist of collocations like *eat breakfast* and idioms like *break the ice*. These four types are not necessarily mutually exclusive. An idiom, for example, may contain a light verb, as in *give someone the gate* or *get someone's goat*.

The question that remains is whether there are other combinations of verb and object that fall outside these four categories. Are there situations in which both the verb and its object clearly express new ideas that are independent of each other? We have already seen that such a situation can indeed arise with a verb and its subject, and that in such cases the subject and the verb are forced by the one new idea constraint to appear in separate intonation units. We saw an example in (9), repeated here as (13):

(13) a ...almost everybody I knéw,
b ....dropped óut.

If a verb and its *object* can be independently new as well, we might expect them, in parallel fashion, to be expressed in separate intonation units as well.

Interestingly enough, although examples like (13) involving subjects are by no means rare, I have found it difficult to locate analogous examples involving objects. The following comes close:

(14) a ...Dóris,
b ..and Bíll,
c ..were tálking about,
d ..that he líved there,

After the introduction of the two subjects in (14)a and (14)b, each of which was a new idea, the separate new event of *talking about* was expressed in (14)c. Precisely what Doris and Bill were talking about, *that he lived there*, was another new idea, and as a result it had to be assigned to a separate intonation unit in (14)d. But this example is quite special. The object of *talk about* was an entire clause, *that he lived there*, expressing a new event. Possibly it is only in cases where the object is an event that the one new idea constraint forces a verb and its object to appear in separate intonation units. If similar examples in which the object is just a simple referent cannot be found, it is tempting to entertain another and bolder hypothesis: that a verb and its object *always* express a single idea. That hypothesis is suggested by the apparent absence of examples of the type just discussed, but also by a deeper consideration of the nature of the verb-object construction itself.

The following amusing example contains several examples of verbs and their objects that can serve to direct attention to the question involved here. The conversation had been about how people who live alone don't like to wash dishes, and someone had mentioned that a person she knew used paper plates so he could just throw them away and not have to wash them. The speaker of (15) then proceeded to talk about someone he knew. I have used the smiling faces to indicate laughter, and italic smiling faces show laughter by another interlocutor.

(15) a One guy Í knew,
b ..hated to wash dìshes so bád,
c that his entìre cóoking apparatus,
d ...consisted ..of a little próng arràngement,
e ..that you plùgged into a uh a wáll outlet,
f ..*☺☺☺*
g ...and you could spìn a hót dog.
h ..betwèen the two próngs.
i ...so that when you plugged it into a wáll òutlet,
j *☺☺* ..*☺☺☺*
k ..☺ríght,
l ..the elèctric cúrrent,
m would rùn ☺through the hót dog.☺

Among the verb-object combinations here, (15)b includes the collocation *wash dishes*. In (15)d *consist of* is an enabling verb, expressing the existence of the *little prong arrangement*. In (15)e, repeated in (15)i, *plug into a wall outlet* might conceivably be regarded as another collocation, although one not as familiar as *wash dishes*. Of greatest interest, however, is the phrase *spin a hot dog* in (16)g. Here the speaker seems to have created a rather peculiar and very specific nonce combination. Yet it too expresses the idea of a single activity performed by the person in question.

We are brought, then, to the question of just what objects do. What role do the participants verbalized as objects play in events? In Mithun and Chafe (1999) we suggested that the function of an object is to express the most immediately involved participant in an event. In a broader perspective such a participant fills the so-called absolutive role. Among the core arguments of a verb, an absolutive argument expresses, as it were, the 'corest' of the core. This role is realized in English by a grammatical object. But English gives priority to the discourse role expressed by subjects, the role of *starting points* for the presentation of an event or state (Chafe 1994:82–92). The result is that with intransitive verbs, where a language must choose between the two very different roles of immediate involvement and starting point, English chooses to mark starting points with its subjects, whereas so-called ergative languages choose to mark the most immediately involved participants as absolutives. But where a language is free to mark both roles, as it can with transitive verbs, English expresses both the starting point role with its subjects and the immediate involvement role with its objects.

This function of absolutives as expressing the most immediately involved participants in events accords with several observations that have been made by others. Edith Moravscik, for example, noticed that transitive verbs constrain the semantics of their immediately involved objects in ways that do not apply to their less involved subjects. For example, the object of transitive *smell* has to be something that emits an odor, and the object of *hear* has to be something that emits a sound (Moravscik 1978). No similar limitations apply to people who smell or hear something, other than that they be normal organisms capable of such experiences. Edward Keenan (1984) noticed that the meanings of verbs are often determined by their objects. Thus, *cutting* refers to different actions in *cut your foot*, *cut your lawn*, *cut your whisky*, and so on. In some languages totally different verbs may be used, depending on the nature of the object, as when one verb means to kill one person and another means to kill many people. It is especially significant that English idioms typically consist of a verb-object combination, as in (12). Russell Tomlin has discussed still other ways in which objects are, as he says, 'bonded' more closely to the verb than subjects (Tomlin 1986:73–101). Here I am interpreting this bonding as reflecting the greater immediacy of involvement of the ideas expressed by objects. In brief, objects define the nature of events in ways that subjects do not.

If this approach is valid, the question that arose with (3), repeated here as (16), need no longer be problematic. The new idea of *this guy*, expressed as a subject, was forced by the one new idea constraint to appear in an intonation unit separate from the new ideas expressed by the verbs in (16)b and (16)c, but in (16)c the idea of *knowing* and the idea of *Lassie* could be expressed in a single intonation unit because the verb and its most immediately involved participant formed a single idea.

(17) a ....And this gúy,
b he wént,
c ..and he knèw Lássie,

To summarize, language is produced as a succession of intonation units, each of which expresses a focus of consciousness. It has been fruitful to hypothesize that an intonation unit can express no more than one new idea—one idea that is being activated for the first time in the current conversation. This hypothesis depends, for one thing, on the restriction of the term *idea* to the mental representation of an event or state, or a participant in an event or state. Other linguistic elements express *orientations* of ideas. The hypothesis is useful in explaining how ideas are distributed across intonation units, as when subjects are separated from verbs by prosodic boundaries, but also in forcing us to be more precise about what constitutes *one idea*.

One site where we might at first expect to find the idea of an event and the idea of one of its participants both new, independently of each other, and for that reason assigned to separate intonation units, is the combination of a verb with its object. But it is difficult to find examples in actual speech where a verb and its object are distributed across separate intonation units for that reason. I discussed four situations in which a verb and its object can easily be interpreted as expressing a single idea. First, there is the construction of a light verb like *have* with a deverbal object like *a talk*. Second, there are enabling verbs like *consist of*, which serve to introduce the idea expressed by the object. Third, there are familiar verb-object collocations like *wash dishes*. Fourth, there are verb-object idioms like *break the ice*. But when one looks at verb-object combinations that might not fit any of these four categories, another hypothesis emerges: that *all* verb-object combinations express unitary ideas. That hypothesis accords with an interpetation of objects as absolutives, and of absolutives as functioning to express the most immediately involved participants in events and states. Can we, then, accept the suggestion that a verb and its absolutive argument together—we might even say by definition—express a single, unitary idea? Only further data from natural speech will serve to confirm, modify, or rule out this possibility. The best disconfirming evidence would be clear cases of verb-object combinations that were distributed across two intonation units because of the one new idea constraint.

Back in the 1950s Anna Granville Hatcher conducted a perceptive study of word order in Spanish, and she discovered among other things that the special word order object-verb was confined to what I have been calling enabling verbs. In writing about this she included the following statement, which can serve as an appropriate epilogue here:

> Can there exist any other task more worth doing in syntax than that of trying to learn how to think systematically about meaning and how meaning matters for language? to find the semantic distinctions that language recognizes in its constructions? The first step is to confess ourselves all ignoramuses—as Bloomfield did; but then, despising the practical conclusion he drew from his human ignorance of meaning, we in syntax must conclude instead that it is time we began to try to learn!
>
> This crude, awkward demonstration has offered only the barest glimpse into that sublime design, that order underlying chaos in language, whose gradual revelation is the task of a syntax that seeks for meaning (Hatcher 1956:43).

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DISCOURSE ANALYSIS AND PSYCHOLINGUISTICS: BREAKING DOWN BARRIERS

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1. THE BARRIER.[1] Though both are 'hyphenated' branches of linguistics, discourse analysis and psycholinguistics have become important players in our discipline over the last two or three decades. And while both share a focus on language in use, there has been a remarkable lack of mutual interaction between the two. They have advanced independently, almost as if there were an invisible barrier between them. This barrier sadly precludes each from either influencing or learning from the other. In this paper, I will explore that barrier, then suggest that the two areas are in fact natural allies which can be mutually enriching. To demonstrate that case, I will call upon a battery of research results which suggest ways in which discourse analysis can profit from work in psycholinguistics, and vice versa.

Is it true that the two areas are more or less independent and, if so, why? The case for their independence can be made fairly simply, just by an examination of some of the most central reviews of the literature.

First discourse analysis. In her landmark *Approaches to discourse analysis*, a book which has become perhaps the best known summary work in the area, Deborah Schiffrin (1994) explores six alternative approaches to the study of language in context, namely speech act theory, interactional sociolinguistics, ethnography of communication, pragmatics, conversational analysis, and variation analysis. But not one of these deals with actual processing issues. No attention is given to processing factors such as attention focus, memory constraints, lexical search mechanisms, or the relation of syntactic structures to particular discourse functions. An examination of earlier works, such as Brown and Yule (1983), or Stubbs (1983), or even the more recent Renkema (1993) or Sperber and Wilson (1995) reveal no substantial attention to issues of language processing.

This admittedly brief glance suggests that discourse analysis has had virtually nothing to say about language processing mechanisms. Of course, there is no value judgement in this observation. A scholar is perfectly free to pursue whatever questions he or she wishes, and no one is obligated to cover all aspects of an area. Rather, we typically pick out questions which interest us, attend to those questions as best we can, and move on. Yet, in so doing, we might indeed be missing out on insights from other areas which could give us important help.

So, if discourse analysis is essentially agnostic with respect to language processing mechanisms as I have suggested, why is this the case? In my view, it is because much of discourse analysis springs from a sociological and sociolinguistic frame of reference. Discourse analysts tend to focus on factors which have sociological import. These include, inter alia, such factors as the sex of the participants, their ages, their relative power positions, the degree of social intimacy existing among them, the social context in which a discourse takes place, the kind of discourse being engaged in (e.g., a casual conversation, a polemical monologue, a set of instructions, etc.), and similar social factors. Much work in conversational analysis, to take perhaps the most familiar approach to discourse, explores how such factors tend to govern the flow and development of a conversation. For example, power relations amongst participants often govern the thematic direction in which a conversation will flow; the social situation tends to color lexical selection, including the use of taboo forms; and the degree of social intimacy among participants correlates with degrees of politeness.

The issues so often discussed in mainstream discourse analysis, such as turn-taking, politeness levels, conversational dominance, openings and closings, topic shifts, etc. are all aspects of conversational competence that we must learn. And the conventions we observe in conversation, albeit virtually unconsciously, are nevertheless firmly contextualized to our culture. Pauses, for example, are treated differently in different cultures, just as are politeness, deference, and turn-taking. All these factors are, in terms of LaBerge and Samuels' (1974) important distinction, *controlled* activities rather than *automatic* ones. We can, after all choose to violate the conventions of politeness, we can interrupt another while violating turn-taking signals, we can use profanity in an inappropriate situation, and we can ramble on with no concern for the other participants in a conversation. From this perspective, discourse analysis is the investigation of language in use and more particularly the investigation of those aspects of language use which are under our control.

When we turn to research in psycholinguistics, we find a similar situation. Psycholinguistics has typically (but with some notable exceptions to be discussed below) focused on the processing of sentences or words in isolation from their natural contexts. Within that blossoming of psycholinguistic experimentation in the 1960s and 70s, for example, sentence processing, and in particular syntactic aspects of sentence processing, lay at the heart of the vast majority of research. Syntactic issues such as paraphrase and ambiguity drove much of the processing research. This was especially true in the heyday of the research dealing with the derivational theory of complexity, when the guiding principles for sentence processing were derived from that version of generative (transformational) grammar in vogue at the time. Language processing was at that time viewed as syntactic processing. Not only was attention focused on syntax to the exclusion of semantics, but the notion of context was deemed irrelevant. In response to the suggestion that context can facilitate the disambiguation of an otherwise ambiguous sentence, Katz and Fodor (1963) argued that some sentences are inherently structurally ambiguous, and contextual disambiguation can only make sense if such inherent ambiguity is accepted *a priori*. Thus, they argued for a treatment of meaning of sentences as totally independent of the settings, context, and situation in which those sentences are constructed.

As the derivational theory of complexity collapsed, sentence processing came to be treated in terms of the notion of parsing. Following Kimball's (1973) pioneering work, parsing approaches were developed to account for sentence processing, primarily in terms of comprehension but more recently in terms of production as well. According to such approaches, the language parser is a set of principles which construct syntactic representations for a sentence. The principles are of course assumed to be language-independent (in the sense that they should be a function of our human cognitive architecture, and as such involve such factors as memory constraints, structural principles of representation, attention focus, retrieval mechanisms, etc.) and should be applicable to any language. At the same time, the parser must interact with the grammatical structures and lexical representations within a particular language to yield appropriate syntactic representation. Scholars like Frazier (e.g., 1978, 1985), Clifton (1993), Frazier and Clifton (1996), and others working in the parsing framework represent attempts to develop parsing mechanisms and principles to account for automatic aspects of language comprehension. They are concerned primarily not with the controlled aspects of language that engage the discourse analysts, but rather with the properties of language processing mechanisms. Yet within all the parsing literature[2], virtually no attention is paid to the role of context.

In the emerging psycholinguistic research dealing with sentence production, a similar gap is found. For example, in his highly influential work *Speaking: From intention to articulation*, Levelt (1989) constructed an elaborate model to detail how we formulate a message and eventually utter it, a model which does not depend at all on any of the current generative grammatical theories, but rather has a highly functional flavor. Yet here too we find no discussion of the role of context on language production. Rather, the focus is on automatic processes, but solely within the domain of the sentence in isolation.

It appears that the barrier separating linguists working on discourse analysis and those in psycholinguistics is a result of a couple of factors. First, the basic framework from which each takes inspiration is different. The discourse analysts are by and large working from a sociolinguistic basis with a strong functionalist orientation and with careful attention to language use. The psycholinguists are driven by theoretical linguistics, and primarily but not exclusively by generative grammar. Second, the discourse analysts tend by and large to focus on phenomena of language use which are *learned*, while the psycholinguists tend to focus on *automatic* processes. So it would appear that the chasm dividing the two approaches is quite natural and unsurprising. I conclude with the rough generalization that in general practice, discourse analysis and psycholinguistics are rather distinct enterprises with little relation to each other. In short, these two disciplines have by and large evolved in isolation from each other.

2. A BRIDGE. However, as is so often the case when we try to taxonomize complex issues into simple and mutually exclusive categories, things are not quite as simple as we first thought. For there exists a third group, not of linguists, but of psycholo-

gists, who do bridge the gap. Here I refer to scholars like Herbert Clark (e.g., 1992), Walter Kintsch (e.g., 1994), and their colleagues. These scholars take an interest in language use, but attend to both the forms of sentences and the role of context in the organization of discourse. Clark and Haviland (1977), for example, have argued that the given-new constraint is involved in determining what particular syntactic form a given sentence might take. This claim has been elaborated and researched widely within psycholinguistics (see, e.g., Prince 1981, Smyth 1988, Prideaux 1993). Given information is that which is shared by both the speaker and the hearer(s), while new information is that which the speaker knows but assumes the hearer does not. For example, as an answer to (1),

(1) Who broke the vase?

(2)a would be an appropriate response, but (2)b would not.

(2) a. It was Sam who broke the vase.
b. *It was the vase that Sam broke.

This occurs in spite of the fact that both (2)a and (2)b have the same propositional content (namely, *Sam* is agent, the *vase* is patient, and the action is that of *breaking*). The reason for the appropriateness of (2)a and the inappropriateness of (2)b is that in the question, the speaker assumes the hearer knows that someone broke the vase, which is shared information, but only the respondent knows the identity of the agent. Thus the agent is new information for the original questioner, and (2)a places the new information, *Sam*, in a position reserved for new information. In (2)b, that position is filled by the *vase*, which is given rather than new information.

Clearly, the given-new constraint is a processing principle which takes as its domain a stretch of language larger than the sentence. At the same time it is understood as an automatic rather than a learned process since it relies on recent memory and an articulated notion of shared knowledge. Here, we have an instance where extended chunks of language, *discourse*, can be treated in terms of psycholinguistic mechanisms of automatic processes.

Thus a bridge over that natural chasm seems possible. In fact, it is precisely the possibilities and potentialities offered by such a bridging between the two domains that has motivated a great deal of research within our own discourse research group over the past several years. Not only is the bridge possible but, I would suggest, it offers the potential for allowing results from one area to inform and illuminate the other.

In the next two sections, I turn to some examples of that bridging, calling upon our own research to show how each can benefit the other in important ways. I will maintain the useful organizing principle of distinguishing between controlled and automatic processes, since it is a defining characteristic of the barrier as I have formulated it. First we examine some results dealing with syntactic issues, followed by a discussion of some lexical matters, a topic more central to the theme of this year's conference.

3. SOME SYNTACTIC EXAMPLES. In this section I briefly review some empirical results from some of our studies in discourse analysis and their relevance to issues in psycholinguistics. In retrospect, I would characterize this research as an attempt to break down the barrier between psycholinguistics and discourse analysis, much in the spirit of Clark and Kintsch, simply because we have addressed issues from an experimental perspective, while at the same time taking into account extended stretches of actual language use. That is, we have accepted that context and discourse are not only important but also crucial in our understanding of how language works. I will sketch contributions to four separate issues, namely markedness, closure, and two social factors which have been shown to govern, in part, the organization of oral narratives. I will also suggest how these results relate to the distinction between automatic and controlled processes.

Markedness, as Andersen (1989) has observed, has for more than a century played an important role in linguistic theory, from phonology to semantics. The markedness principle states that the unmarked member of a set of forms tends to be prototypical, more frequent, less presuppositionally loaded, and more widely distributed than the corresponding marked form. Markedness has been treated primarily in formal terms, but not in terms of the possible discourse functions that markedness might serve. For example, it has been argued (e.g., by Clark & Clark 1977) that when a complex sentence contains a subordinate adverbial clause (SC) or phrase (AdvP), the marked member is one in which the subordinate clause or phrase is preposed. Thus, in (3) and (4), the unmarked members are (3)a and (4)a.

(3) a. Sam had left before Fred arrived at the party. MC+SC
b. Before Fred arrived at the party, Sam had left. SC+MC
(4) a. Sam finally finished his LACUS paper on Sunday. MC+AdvP
b. On Sunday, Sam finally finished his LACUS paper. AdvP+ MC

In our work dealing with the way speakers organize information and produce narrative descriptions, we were able to address the question of the function of marked structures. Using a methodology similar to that developed by Chafe (1980) in which subjects watch a short film and then provide an oral or written narrative description of what they have seen, we carried out a similar series of studies using varied film clips. In some, our participants provided on-line descriptions, while in others they provided off-line narratives, either immediately after seeing the clips or after a delayed (two-week) period. Sometimes the participants provided their descriptions to a friend, sometimes to a stranger, and sometimes to the experimenter. The film clips were analyzed and chunked into episodes, each containing a series of events. The episode boundaries were typically characterized by a shift of scene, time, or participants.

	Episode Position	
Structure	**Initial**	**Medial**
MC+SC (unmarked)	2	35
SC+MC (marked)	23	11

Table 1. Oral narrative adverbial clause distribution

We then examined the narratives, which had been recorded, transcribed, and coded for several syntactic properties. We isolated every instance of a complex sentence containing either a subordinate clause or adverbial phrase. We found that within an episode, the preponderance of these structures was unmarked, but at the beginning of episode, the vast majority was marked. For example, for one study in which 40 participants each described the same film clip, the distribution of marked and unmarked structures was tabulated (Table 1).

These results clearly demonstrate that one function of marked structures is to code episode boundaries. Clearly, not all such transitions are coded by marked structures, but the relative proportion of marked structures changes significantly ($\chi^2 = 30.1$, $p < .0001$) depending on whether the speaker is shifting topics or remaining within one thematic unit. In addition, some marked structures were found within episodes, and upon examination of those particular cases, we found that all were used to code the most salient event within the episode, that event without which the entire clip would have been rendered meaningless. A more detailed discussion of these results can be found in Prideaux and Hogan (1993).

Similar results were found for Mandarin. In a study using the same methodology, Pu and Prideaux (1994) found that Mandarin speakers also tend to use marked structures to code episode boundaries, but within episodes their unmarked counterparts prevail. In a study based on text analyses and translation tasks, Prideaux and Yoshida (1994) found exactly the same results for Japanese.

We conclude that markedness is not just of formal interest but, from a cognitive perspective, it plays an important role in actual language production. Speakers make choices about shifting topics, and they then employ particular devices to indicate to their hearers just what they are doing. Is this strategy automatic or learned? Clearly, naïve native speakers do not appear to be conscious of the strategy, but there is evidence that it is a discourse strategy which has been acquired, just as grammatical structures have been acquired. McEwen and Prideaux (1997) examined the acquisition of narrative discourse strategies and found that markedness appears relatively late in children's repertoires of discourse management devices. Thus, automaticity comes later, but it does come.

Let us now turn to the issue of closure, a processing principle which has engaged psycholinguists' attention since at least the time of Kimball's (1973) seminal work on parsing, and one which has been explored extensively by Frazier (e.g., 1978, 1985). CLOSURE is a generalized Gestalt principle in terms of which we package information. Because of working memory limitations, for example, we have only limited resources to allocate to a task and closure is a means for assembling one piece of information, perhaps at the same time clearing our active (syntactic) buffer in order to deal with new incoming material. Although several versions of closure have been offered, they all predict that an uninterrupted structural unit (clause, phrase, etc.) should be easier to process than one which is interrupted, simply because suspension of processing on one unit in order to attend to another increases the demands on working memory. We can define closure roughly as follows:

> CLOSURE: A constituent (e.g., clause) which is internally interrupted by another instance of the same constituent (e.g., another clause) will require more processing resources (i.e., will be more difficult to process) than that same constituent which is not internally interrupted.

Thus closure would predict that though (5)a and (5)b are both perfectly grammatical, (5)b should be harder to process, since it has an interrupting relative clause.

(5) a. The deliveryman startled the kid [who was stealing the bike].
b. The kid [who was stealing the bike] startled the deliveryman.

Most of the research supporting closure has come from studies in language comprehension, chiefly from reading studies, and most have focused on sentences in isolation. Yet discourse studies like those mentioned above provide an ideal alternative, one in which language production data can be called upon to assess the role of closure. If closure is operational in production, we would expect to find more instances of sentences with relative clauses attached to final NPs than to those which are sentence-internal. This empirical issue can be addressed directly in experiments like those described above.

In a series of studies dealing with this issue, narrative descriptions were elicited from participants in a long series of studies (see, e.g., Prideaux 1993). In one study, participants provided written descriptions of a film clip, while in another study different participants provided oral narrative descriptions. In a third study, text counts were carried out on a variety of written texts. In all cases, a strong tendency was found for the attachment of relative clauses to final NPs.

Since closure is the result of an architectural constraint on processing, namely memory limitations, it is necessarily an automatic rather than a learned strategy. Here again, we have a contribution from discourse analysis to an important psycholinguistic question. Closure is supported from a broad variety of experimental methods, and as such its importance is highlighted in our understanding of language processing. The two issues discussed above, markedness and closure, have played important roles in linguistic theorizing. I have argued that precise studies within discourse analysis can contribute to our understanding of their psycholinguistic content as well. But can psycholinguistic methodology also contribute to a further understanding of issues of discourse analysis? My answer is yes. Permit me to provide a couple of examples, one from our own research and one from one of my student's current research.

One advantage of approaching discourse analysis from a psycholinguistic rather than a sociolinguistic perspective is that sociological factors which often contaminate results in anecdotal studies can to a large extent be controlled. For example, in many discussions of the role of the sex of participants, a confounding factor is one of the relative powers of the participants. An example will suffice. To what extent does the degree of intimacy between participants in a discourse constrain and govern the kinds of language used by participants? It might be argued, on the one hand, that the more familiar two participants are with each other, the less they might have to say, given their overlapping shared knowledge base and their familiarity with the other's views. On the other hand, it may be that the more intimate two people are, the more likely they are to argue their own positions with vigor, since each knows the other's position on a variety of issues. So, which is it?

This is clearly an empirical question, and one which can be tested in controlled conditions. It is no good simply to offer anecdotal evidence for one or the other position, since a host of confounding variables is clearly available to influence any such set of observations. The obvious solution is to construct a controlled situation in which the degree of intimacy is controlled. The methodology of narrative production discussed above has been exploited to examine such factors as the relevance of relative intimacy on the kinds of language produced by participants. In a series of experiments, participants were asked to view a film clip and then relate the contents to (a) a friend (of the same or different sex) and to (b) a stranger. The order of narratives was counterbalanced, so half of the participants first narrated to a friend and the other half to a stranger. Eighty narratives were collected, transcribed, coded, and analyzed.

The results were very revealing. While the order of narration (to a friend or a stranger) was not statistically significant, the status of the addressee was highly significant. Speakers tended to elaborate far more to their friends than to strangers. The amount we care to relate, the assessment of others' shared knowledge, and the degree of confidence we find in speaking to another all reflect upon how we carry out that discourse. Here, then, we have a case of controlled performance. We make choices, perhaps not overtly conscious, but nevertheless socially conditioned, and we speak accordingly. Thus, we have in this simple instance a case in which the methods of controlled psycholinguistic experimentation can contribute to an understanding of discourse properties of the more familiar sort, those in which choices are made, and those choices are reflected in the kinds of language used.

In a recent study, Wallace (1999) has explored the notion of duetting, the situation in which two individuals together relate a mutually experienced set of events. This kind of discourse, which is actually quite common, has been only briefly explored in the discourse literature, with conclusions based solely on anecdotal evidence. Wallace, however, chose to examine the phenomenon in the context of a psycholinguistics experiment. He focused on how politeness strategies differ as a function of the relative intimacy of the participants. Again, he used the technique of having pairs, either a couple or a pair of complete strangers (always of the opposite sex) view a film clip and then describe the contents to the experimenter. He found dramatic differences in politeness levels in terms of interruptions, hedges, and types of face-savings in the two conditions, with couples far less polite than strangers. Here again we have a case where the methods of psycholinguistics can inform discourse analysis and allow it to advance beyond anecdotal evidence.

In these four examples, I hope to have demonstrated how the barrier between research in psycholinguistics and discourse analysis can be broached such that each can inform the other in significant ways.

4. LEXICAL EXAMPLES. The study of the lexicon currently occupies a position of considerable prominence within both linguistics and psycholinguistics, as many of the papers presented at this year's meeting attest. Perhaps one of the most hotly debated areas is that of how lexical access takes place. There are, to my mind, two rather distinct theoretical stances on the nature of lexical access, one centered roughly around the work of Levelt (1989, 1991), and one based on prototype theory as developed initially by Rosch (1975) and her colleagues (e.g., Rosch & Mervis 1975) and elaborated by, e.g., Lakoff (1989).

In Levelt's view, each lexical item has its own well-defined core, with families of lexical items organized hierarchically. For example, if we consider the items *animal*, *dog*, *schnauzer*, Levelt's view of lexical organization requires a set-theoretic inclusion such that the superordinate element *animal* would include *dog*, which would in its turn include *schnauzer*. This view of lexical organization poses an interesting problem for lexical access, namely what Levelt calls the 'hyperonym problem'. The problem is simply that when a subordinate term (e.g., *schnauzer*) is activated in the process of lexical access, the superordinate terms are also activated (e.g., *dog*, *animal*), a process which Levelt denies takes place.

According to prototype theory, there exists within a 'semantic field' of related lexical items or concepts, a base level form, the expression which best characterizes the field as a whole. For example, *dog* is the base level form which characterizes the semantic field consisting of terms like *poodle*, *schnauzer*, *collie*, etc. Moreover, the theory suggests that a particular term, the prototype, is treated by speakers as the best exemplar of the set, even though the actual prototype might be an abstract amalgam of the relevant properties. (It would be interesting to see what North Americans consider the best exemplar of the *dog* set.) One might conceptualize a particular semantic field (such as the *dog* field) as having a superordinate category or hyperonym, such as *animal*, as well as a set of terms included in the field (e.g., *schnauzer*, *poodle*, etc.), namely the hyponyms. From the including to the included terms, we have an inclusion hierarchy of hyperonym – base term – hyponym such as *animal* – *dog* – {*poodle*, *schnauzer*, *collie*}.

Although there now exists a vast body of literature dealing with lexical access, most of it has come from within rather conventional psycholinguistic paradigms such as lexical decision tasks, phoneme monitoring, semantic priming, etc. Virtually all such research, as best I can determine, deals with words in isolation, with concessions to the role of context being found only in semantic priming tasks. I suggest that work in discourse analysis can contribute to a fuller understanding of lexical access, albeit in a rather indirect way. In one series of studies, designed to test for factors quite distinct from those of lexical access, we had participants provide both on-line and off-line descriptions of events they were watching on a TV screen. The on-line descriptions were of the familiar 'play-by-play' sort which sports commentators offer up in such profusion. In such conditions, there is a considerable time pressure to get the words out, since events move along quite quickly. In the off-line condition, however, there is time for planning, and the speaker has the luxury of working from a memory representation of what was seen.

For the purposes of this presentation, I will focus on studies involving two distinct film clips. One was taken from the Charlie Chaplin movie *The Gold Rush* and consisted of a scene in which Chaplin and a hunter are engaged in a chase scene in and around a cabin which is teetering on the edge of a cliff. The other is from a children's TV series called *Wishbone*.

The research question is whether there is a difference in the kinds of lexical items chosen by speakers in the on-line condition, where there is a time pressure, and the off-line condition, where there is time for planning. More specifically, it was hypothesized that in the on-line condition the relative frequency of base level terms would be higher than in the off-line condition, since in the on-line condition there was great time pressure and accordingly little time for elaborated search and decision making. In order to test this hypothesis, it was necessary to find a semantic field which had enough mentions to be statistically revealing. Two such fields were found, one referring to the actual cabin itself, and the other referring to the gun used by Chaplin's companion.

The results were clear. In the time-pressured on-line condition, participants used relatively more base level terms than hyponyms, whereas in the off-line condition, without the time pressure, relatively fewer base level terms were used. The results are found in Table 2.

If we define a 'base level ratio' (BLR) function as the proportion of base level terms used, divided by all the terms used in the semantic field, we can establish the function **BLR = B/(B+H)** where **B** is the frequency of base level form and **H** is the frequency of hyponyms. According to our hypothesis, BLR should be higher in the on-line condition than in the off-line condition, a prediction which can be tested statistically. There were 40 participants in the study, and the on-line and off-line pooled data were subjected to a χ^2-test. The changes are statistically significant. For the *dwelling* field, $\chi^2 = 9.20$, $p = .0028$, while for the *weapon* field, $\chi^2 = 10.98$, $p = .0013$. Thus, when the data for all participants are pooled, there is clear empirical support for the

	Unplanned (On-Line)			**Planned (Off-Line)**		
	Dwelling Field					
Item	base-level	hyponyms	BLR	base-level	hyponyms	BLR
Freq.	161	115	0.583	145	143	0.503
	Weapon Field					
Item	base-level	hyponyms	BLR	base-level	hyponyms	BLR
Freq.	257	111	0.698	167	124	0.574

Table 2. Base level ratios for the *dwelling* and *weapon* fields.

prediction that the unplanned condition will elicit a relatively larger number of base forms to hyponyms when compared to the planned condition.

In the *Wishbone* study, exactly the same results were obtained. In that study, some 40 participants also provided on-line and off-line narrative descriptions, and the semantic fields with enough specific mention revealed exactly the same patterns. The relevant fields here were car (base level) versus remote-controlled car/toy, truck/jeep. In the on-line descriptions, there was a significant tendency for participants to use relatively more base level terms than hyponyms, while in the off-line condition, where there was adequate time for planning, the base level ratio fell significantly ($\chi^2 = 10.63$, $p = .0015$).

What are we to make of these results? Two quite distinct contributions, I would claim. The first is a methodological one: data from discourse analysis research, when collected under controlled conditions, can contribute to the lexical access debate. In this pair of studies, we find that speakers advert to base level terms relatively more often when under time pressure than when they have time for planning. Second, and perhaps more interesting, is the fact that Levelt's hyperonym problem does not vanish! The fact that participants in the off-line condition advert to hyponyms suggests that such activation was actually present but was suppressed due to the pressures of time. Thus, these results lend some further support to the prototype approach to lexical access and suggest that the hyperonym problem is not to be dismissed.

Lexical access is an automatic process, but one which is at the same time governed or at least constrained by other factors, not the least of which is the pressure of time in speaking. In this short section, I have argued that discourse analysis research can contribute to a further understanding of a major issue within psycholinguistics, namely the nature of lexical access. Again, a bridge has been built, and a barrier torn down.

5. CONCLUSIONS. I conclude with the perhaps self-evident observation that the processes involved in language comprehension and production are inevitably and crucially linked to the contextual situations in which production and comprehension takes place. I have attempted to demonstrate that while psycholinguistics as it

is usually practiced, and discourse analysis as it is typically carried out, may have quite different goals, each can nevertheless contribute substantially to the other. More specifically, I have invoked the notion of automatic versus controlled processes and have suggested that this distinction is heuristically useful in bridging the gap between the two fields. I hope I have succeeded in opening a door between the two fields, since such can only advance our understanding of how language is used: how it is produced, comprehended, and how we as speakers organize our discourse both for ourselves and for our hearers.

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[2] For an excellent overview of the various approaches to sentence parsing, see Mitchell (1994).

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COHESION AS A MEASURE IN GENERIC ANALYSIS

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Cohesion, a property of any successful text, is also present in spoken language. Speakers relate their utterances to previous ones through the use of cohesive relations; a cohesive tie is established. Cohesive ties enter into cohesive chains, which run throughout a text, revealing how different parts of a text are related to each other.

In this study I describe the results of an analysis of cohesive relations in a bilingual (English and Spanish) corpus of task-oriented dialogues. The two research questions I would like to address relate, first, to the relationship between the generic stages of the conversations and the boundaries of cohesive chains. The dialogues, as instances of a scheduling genre, proceed in clearly defined stages. I will show how cohesive chains are clearly related to stages in the dialogue. The second research question concerns measures of cohesive harmony in speech. The dialogues, although perfectly functional, seem to contain very low cohesive harmony. I suggest that different measures of cohesive harmony are necessary for different genres.

1. the corpus. The corpus used was a total of 60 conversations between dyads of two native speakers each, 30 in English and 30 in Spanish. For each language, the conversations are broken down in ten female-female, ten male-male, and ten female-male dialogues. The dialogues were collected by the Interactive Systems Laboratory of Carnegie Mellon University as part of janus, a large speech-to-speech machine translation project[1]. The dialogues are transcribed including all human and non-human noises, intonation, and divided into semantically independent units, or Semantic Dialogue Units (sdus). Sdus are clauses for the most part. Sometimes sdus are constituted by phrases or words that were intonationally separated from the rest of the turn. The translation of Spanish examples is a free translation, rendered one clause at a time[2].

The conversations are considered instances of a genre, as a purposeful, staged, goal-oriented activity (Martin 1985), which we might denominate *scheduling genre*. They are instances of talk produced for a very specific purpose, that of setting up an appointment. As a result of what we could call their practical purpose, the conversations are staged in particular ways: one speaker proposes a meeting, perhaps also a time; the other speaker replies either with a different time or with their availability for the time proposed. The conversation continues until a day and a time have been set. As a result of their social function, the conversations usually have Opening and Closing stages, and polite devices that will avoid face-threatening acts to the other speaker. Given their task-oriented character, we can expect them to show a structure more uniform and less deviant from an idealized model than, for instance, casual conversation. The task usually has a clear structure, consisting of steps that have to be taken in a certain sequence in order to successfully complete the task.

There are three main stages in the conversations: Opening, Task Performance and Closing. The Openings and Closings resemble those present in telephone conversations. The speakers begin the conversation with brief greetings or vocatives, and close it by repeating the date agreed upon and signaling leave-taking. The Task-Performance stage is the main body of the dialogues, and it contains two other types of stages: Date Proposal and Place Proposal. The Date-Proposal stage is initiated when one speaker proposes a date, and it continues until the date has been accepted or rejected. If the date is rejected, one of the speakers will initiate a new Date-Proposal stage. The dialogues may, then, contain more than one Date-Proposal stage. Place-Proposal stages are optional; they occur when an appropriate locale for the meeting is arranged.

2. A BRIEF INTRODUCTION TO COHESION. According to Halliday and Hasan (1976), the property of being a text is called texture. Texture is what distinguishes a text from a non-text, and it is derived from the fact that the text functions as a unity with respect to its environment. Texture is realized in relations existing between parts of a text. Let us look at one example.

(1) …Would you like to meet possibly, between the seventh to the tenth? Anytime during those days would be fine.

In this example, *those days* refers to *between the seventh to the tenth*. There is a relation between those two phrases that makes the two sentences become a text, because they hang together as one unit. This relation is a *cohesive relation*, and the pair of related items is a *cohesive tie*. (Obviously, no single item is cohesive in itself. Although I will be referring to *those days*, and categorizing it as a particular type of cohesion, we should always bear in mind that cohesiveness is established through the relation between the two items, not by one item in isolation.)

The meaning of this relation is that the two items refer to the same thing; they share corefentiality. Identity of reference, as we shall see, is not the only type of cohesive relation, there also exist relations of similarity. But in a more general sense, cohesion occurs when the interpretation of some element in the discourse depends on the interpretation of another one, whether preceding or following. In our example above, *those days* presupposes *between the seventh to the tenth*. We need to refer to the latter in order to resolve the presupposition. The fact that it is resolved successfully establishes the cohesive relation between the two clauses.

There are, in fact, two different types of tie between *those days* and its presupposed element. *Those* establishes a relation of demonstrative reference, whereas *days* is a general word that subsumes specific instances of days. Cohesive relations are classified as: reference, substitution, ellipsis, conjunction and lexical cohesion. The first three types are usually referred to as anaphoric relations. For the analysis described here, I excluded conjunction, because I believe that it captures slightly different relations—relations among clauses, rather than among referents in the text. Elsewhere (Taboada forthcoming) I performed an analysis of conjunctive relations in this corpus, through Rhetorical Structure Theory (Mann & Thompson 1988). The types of cohesion considered for the present analysis are listed in Table 1.

Cohesive ties are established between elements in the text (endophoric reference), not with elements that have their referent outside the text (exophoric reference). In addition, the relationship in a tie can be measured in terms of the distance between its components. The relationship might be immediate (the cohesive element refers to an immediately preceding one), remote (the referent is more than one clause away) or it can be mediated, where the ultimate referent is a few clauses earlier in the preceding discourse, but it has been recaptured in some other element. A cohesive element could also have a cataphoric relationship to some other element in the discourse to follow.

The concept of mediated ties brings us to the next important concept in cohesion, that of cohesive chains. If two ties are mediated by a third intervening one, then the three of them enter into a cohesive chain. Let us look at Example (2), from the Spanish corpus. One of the cohesive chains running through these two turns is one that relates to food. The speakers have decided on a lunch meeting, and thus *restaurante*, *comida* and *estomaguito* can all be related to this topic. The chain begins earlier on in the conversation, but here we can see part of it with six links (**bolded**). If there was only one preceding item, the chain would then be seven links long. All of the links are instances of lexical cohesion: repetition of the same item and collocation. Most texts contain more than one chain: in the example we can see there is another chain relating meeting times.

(2) **s1**: Okay, está, acordamos entonces que sea martes, me parece mejor a las doce y treinta, así yo termino clases a las doce, y alcanzo a llegar al **restaurante** a las doce y treinta *pause*. Lo que me parece más bien que definamos es a dónde quieres ir? Tú dime qué qué tipo de **comida** quieres para el martes. O si tu religión te impide /begin_laugh/ algún tipo de comida especial, entonces evitamos ese tipo /end_laugh/ de **restaurantes**.

s2: Correcto Mónica. Nos vemos entonces ese día a las doce y treinta. /eh/ Como te decía yo pasaré con Len, y no tengo ningún problema con la **comida**, como buen pobre y colombiano que soy *pause* tengo acceso a cualquier /begin_laugh/ tipo de **comida** /end_laugh/. Mi **estomaguito** me lo permite. Gracias mija.

(2) **S1:** (Translation) Okay, it's, we agree then that it's Tuesday. I think it's better at twelve thirty, that way I finish my classes at twelve, and I'll manage to get to the restaurant at twelve thirty *pause*. What I'd like for us to define is where you want to go? You tell me what what kind of food you want for Tuesday. Or whether your religion forbids any type of special food, then we'll avoid that type of restaurant.

S2: (Translation) Right Monica. We'll meet then on that day at twelve thirty. As as I was saying I'll come with Len, and I have no problem with the food, being a good poor and Colombian as I am *pause* I have access to any /begin_laugh/ type of food /end_laugh/. My stomach allows it. Thank you dear.

Cohesive chains and chain interaction are the most interesting constructs in describing cohesion and, ultimately, coherence in a text. Many scholars have pointed out that cohesion and coherence are not all-or-nothing categories, but a matter of degree. Parsons (1996) states that, in any given text type, there is a gradation dependent on the extent to which a text relies on cohesion to provide coherence. He takes as starting point the work of Hasan (1984), and Halliday and Hasan (1985) in the development of the concept of *cohesive harmony*. Hasan defined a chain as a set of items, each of which is related to the others by cohesive relations of whatever type.

Chains do not usually occur in isolation, but alongside other chains. However, the mere presence of two or more chains in a text does not guarantee a cohesive effect. Although chains contribute to cohesion in a text, they need to be related to each other somehow. This relationship is called *chain interaction*. The relationships are mostly grammatical, in the Transitivity structure. Hasan establishes a minimum requirement for chain interaction: at least two members of one chain should stand in the same relation to two members of another chain. For a better definition of the interactions, she divides the tokens in a text in three categories:

- Relevant tokens: All tokens that enter into chains, further divided into:
  - Central tokens: relevant tokens that interact
  - Non-central tokens: relevant tokens that do not interact
- Peripheral tokens: Tokens that do not enter into any kind of chain

We are, finally, in a position to define cohesive harmony, which is the function of three phenomena:

- Low proportion of peripheral tokens to the relevant ones
- High proportion of central tokens to non-central ones
- Few breaks in the interaction

Hasan affirms that coherence is a function of cohesive harmony. Our perception that a text is coherent, that it somehow makes sense, is dependent on its cohesive harmony. We will examine the apparently low cohesive harmony of the dialogues, given their low chain interaction.

		English	% English	Spanish	% Spanish
R1	Reference, personal	5	1.08	7	1.13
R2	Reference, demonstrative	108	23.28	49	7.9
R3	Reference, comparative	0	-	3	0.48
S1	Substitution, nominal	1	0.22	0	-
S2	Substitution, verbal	1	0.22	0	-
S3	Substitution, clausal	2	0.43	0	-
E1	Ellipsis, nominal	8	1.72	19	3.06
E2	Ellipsis, verbal	8	1.72	15	2.42
E3	Ellipsis, clausal	4	0.86	5	0.81
L1a	Lexical, same, identical	141	30.39	274	44.19
L1b	Lexical, same, rephrased	67	14.44	43	6.94
L2	Lexical, synonym	23	4.96	33	5.32
L3	Lexical, superordinate	9	1.94	25	4.03
L4	Lexical, subordinate	58	12.5	45	7.26
L5	Lexical, general word	8	1.72	33	5.32
L6	Lexical, collocation	21	4.53	69	11.13
n	Total number of links	464		620	

Table 1. Cohesion types in the corpus.

3. COHESION IN SCHEDULING DIALOGUES

3.1. COHESION TYPES. In the corpus, I identified the types of cohesion described in Table 1. Each instance in the table is to be interpreted as the relationship of one cohesive item to the item that preceded it, that is, as one link. Note that the figures are the overall numbers in the corpus, a total of 60 conversations.

I will first discuss the results for each language, then focusing on a comparison of the two. In English, by far, the resource used most often is lexical cohesion (70.48% of the links are lexical), and more specifically the repetition of the same item. I divided the repetition of same items into two different categories, one where the item is repeated verbatim, and another one where there is some difference in the tie. The reason for this division is that I had the impression that speakers tended to repeat exactly the same terms. They do repeat dates and times quite often. Because the discussion of dates places a high burden on working memory, dates are tossed back and forth and repeated. Dates and times are proposed and abandoned constantly. The speakers need to make sure that they are discussing the same date, and thus they tend to repeat the date at the same time as they mention their availability or unavailability for that particular date.

The same reason justifies the high number in the L4 category, lexical subordinate items. The speakers start out with a two-week window, and then narrow down from

	English	Spanish
Cohesive Links	464	620
Words	6804	9112
Ratio	0.068	0.068

Table 2. Ratios of cohesive links to words in the corpus.

that. Overall, lexical cohesion is the most used device to establish cohesion in these conversations.

After lexical cohesion, reference is preferred. Within reference, English showed no instances of the comparative, only a few of the personal, and a high percentage (23.28%) of the demonstrative type. Instances of personal reference are personal pronouns used to refer to a previous date. The demonstrative can be a modifier or head of a nominal group, sometimes accompanied by a general word, such as *days* or *times*. Another frequent instance of the demonstrative is the use of an adverb, such as *then* or *there*, to refer to the date or place agreed upon.

The last two types of cohesion in order of frequency are substitution and ellipsis. They are both closely related, since ellipsis is substitution by zero. It is clear, from the table, that speakers do not favor these two types. My hypothesis is that they both place a heavy burden on the speakers' minds. It takes extra effort to resolve elliptical references, and, to a certain extent, substitution as well. The figures for the two are very small, making it difficult to draw comparisons. However, ellipsis is used more often. That is, speakers prefer to leave something unsaid than to use a substitute term for it.

Now let us turn to the study of the Spanish data. Most of the phenomena described in English apply to Spanish: higher numbers in lexical cohesion and, within grammatical cohesion, preference for the reference type. There are a few differences worth noting. At first sight, Spanish seems to employ a higher number of ties (620 versus the 464 of the English corpus). However, they are in exactly the same ratio per words as in English (Table 2). Both languages use exactly the same ratio of cohesive devices per word; they only use different proportions of each, as we shall see.

The tendencies in Spanish show, again, a high preference for repetition of the same lexical item, whether in identical form or somewhat rephrased. This type of lexical cohesion is used more frequently than in English, with the identical repetition being the preferred type. The Spanish speakers used lexical cohesion 84.19% of the times a cohesive link was used, a slightly higher percentage than the English one (70.48% for lexical cohesion). In the reference category, we find the most marked difference between the English and the Spanish data. The three types of reference account for 24.35% of the relations in English, whereas it is only 9.52% in Spanish. Demonstrative reference seems to be much more highly preferred in English. In ellipsis the Spanish percentages are closer to the English ones.

The most intriguing category for Spanish was substitution. I could not find any instance of substitution in the Spanish corpus. As I noted above, the frequency of substitution is low in English, but in Spanish it was simply non-existent in my data. Now let us ponder what substitution would look like in Spanish. Consider the following example.

(3) Which book do you want? The red one.
¿Qué libro quieres? El rojo.

In English, the answer uses *one* as a nominal substitute for *book*. In Spanish, the noun is omitted, leaving us with a case of ellipsis. I will not enter into what category *rojo* is, whether adjective or nominalized adjective. But it is clear that there is no substitution. Even if we argue that *rojo* is a substitute for *libro rojo*, we then have a case of repetition, and thus lexical cohesion, but no substitution. Nominal substitution seems to be ruled out for Spanish.

In verbal substitution, English utilizes a number of elements to replace the process or the process plus complements, mainly the auxiliary verb *do* or *do so*, as in (4), where *do* replaces *know her*[3]. In the Spanish counterpart to this example, ellipsis is used instead, leaving the subject pronoun *yo* to stand on its own.

(4) Nobody knows her better than I do.
Nadie la conoce mejor que yo.

This is not to be interpreted as a total absence of substitution in Spanish. The verb *hacer*, a rough equivalent of *do*, is used in some cases. In (5) *hacer* replaces *invadir*.

(5) ¿Van a invadir Kosovo? Parece que eso es lo que van a hacer.
Will they invade Kosovo? It looks like that's what they're going to do.

My impression in this case is that there is a very fine line between this substitution and the lexical cohesion instance where a word is referred to with the class of general words. After all, *hacer* is not as grammaticalized in Spanish as *do* is in English, and we could very well account for (5) by taking it to be an example of lexical cohesion: the use of a general word to refer to a subordinate instance of the same class. Indeed, Casado Velarde (1997) joins substitution and reference under a 'substitution' heading in his description of textual phenomena in Spanish. There he includes lexical proforms—among them the verb *hacer*—but also reference.

Finally, let us look at clausal substitution, where an entire clause is presupposed by an item, in English typically *so* and *not*. In our first example, (6), the English example—adapted from Halliday and Hasan (1976)—substitutes the previous clause by *so*. A possible Spanish translation would use a demonstrative pronoun, *eso* (the rough translation of the Spanish would be 'they say that'). Unless we interpret

	English	**Spanish**
Immediate	33.45	30.92
Mediated	51.21	56.71
Remote	14.61	12.07
Cataphoric	0.72	0.3
Mediated – Average distance	3.41	4.25
Remote – Average distance	1.16	1.79

Table 3. Average directions and distances (in clauses) per conversation.

the class of demonstrative pronouns as doing double duty, that is, providing reference and substitution, this is an instance of reference.

(6) Is there going to be an earthquake? They say so.
¿Va a haber un terremoto? Eso dicen.

In other instances of short answers, ellipsis again seems to be the alternative in Spanish, rather than substitution. Example (7) is again substitution in English and ellipsis in Spanish. One could argue that *sí* and *no* are the substitute terms for the previous clause. However, the sentences could be completed in Spanish without alterations (*Creo que sí se han marchado; Espero que no se hayan marchado*), which is not possible in English. This leads me to believe that the Spanish speakers are simply leaving the information out.

(7) Did they leave? I think so. / I hope not.
¿Se han marchado? Creo que sí. / Espero que no.

These observations on the nature of cohesion in Spanish are, of course, preliminary. Since my corpus did not contain any instances, I can only speculate about what substitution could be like in Spanish. A larger corpus across different genres and modes would be needed.

Table 3 displays the averages of these types, and the length of the distance in the mediated and remote types per conversation. The table shows that, on average, a conversation will have mediated ties as the most likely type, followed by immediate ones, and then by remote. Cataphoric links are the least common ones. In the mediated type, the average distance between the link under consideration and the first referent—measured in clauses—is 3.41 and 4.25 clauses, for English and Spanish respectively. Thus, even though mediated is preferred over immediate, the length of intervening material in a mediated link is not large: about four clauses. In the case of a remote link, the constraints on distance are more stringent: only one or two clauses on average will separate the two elements in a cohesive tie.

	English	Spanish
Average number of chains per conversation	4.43	4
Average length of chains (number of links)	4.99	6.56

Table 4. Average number and length of chains.

From this we can see that speakers avoid placing an excessive burden on each other's working memories. Elements that are relevant—supposedly the ones in mediated chains—are repeated frequently. Even when there is a remote link, the distances are very close. This might be a characteristic of spoken language, since it is difficult to keep a large number of items in working memory at the same time—seven, plus or minus two, is the magical number, according to Miller (1956). In addition, this particular type of spoken language requires an extra effort from the participants, given the number of dates, times and places that are being passed from one interlocutor to the other one, since chains typically cross over turns.

4. 2. CHAINS: TYPES AND LENGTH. The analysis of cohesive types in the corpus is interesting *per se*. It comes to have full importance only if we consider those links as they are integrated in cohesive chains that run through the text. A cohesive chain is a series of links that are connected to each other through some of the relations already described.

Most of the cohesive chains in the dialogues included days, times and events. In a few instances, they referred to speakers' activities. Numerically, the English corpus contained a total number of 133 chains; the Spanish one 120. The average numbers per conversation are presented in Table 4. Each conversation has, on average, about four chains, with the English ones showing a slightly higher number. However, these chains are longer in Spanish than they are in English.

The most interesting aspect of the chains running through the conversations is that they hardly interact with each other. The typical conversation structure is one where a chain is introduced, discussed and abandoned. After abandoning a chain, a new one is introduced, with little, if any, interaction with the first one. If we follow the chains in most conversations, starting a new one where the previous one finished, the graphical representation of the chains is a right-leaning slope. In order to illustrate this more clearly, I have included a conversation from the English corpus, in (8), which is represented in Figure 1. There are a few minor chains running through the text, which interact to a certain extent with the major ones. The interaction is shown through horizontal arrows in the figure. The main four chains, however, do not interact at all with each other. The links found in the figure are **bolded** in the text.

(8) **S1**: Heather, how's your schedule for, **the fourth**. I'm free all **day**.
S2: /hm/ **The fourth**, I think **that**'s **the date**, **it**'s, **that**'s **today** isn't **it**?
S1: Okay, never mind… What about, /hm/ **the fifth, like at noon**.

(8) s2: **The fifth** works for me, I'm free all **day**.
s1: We have two hours between **there**, well, let's see, I have a lab, **at two o'clock**. What about, **Friday the sixth**, I'm free **all day**.
s2: /hm/ **That**'s kind of rough. /um/ Unless we did it like, **eight to ten**. Then I'd have to rush to **a meeting** with Dave. 'Cause **that**'s **at ten**.
s1: Okay. /um/ Let's try **the next week**. On, **the ninth and the tenth**, I can, meet you, from one thirty, on, I'm free. How 'bout you.
s2: /oh/
s1: Heather, I didn't get that last bit **for the ninth** and **the tenth**. I just had blank. Can you repeat **that**?
s2: I'd love to repeat it, 'cause I messed up, anyways, /um/ **the ninth**, I can't, 'cause I have to meet Michael at the airport at three fifteen. But **the tenth**, I just have to prepare **a seminar**. So, what time's best for you on **the tenth**.
s1: /um/ After, we'll see **one fifteen** to the rest of **the day**, I'm free, so, how's your schedule look for **that**.
s2: Well, I can **prepare that seminar all morning**, and, like later on **in the evening**, if need be **so**, how 'bout **two o'clock**.
s1: **That**'s fine, I'll see you **January tenth**, **at two o'clock** for, **two hours**, and I'll see jus, I'll just see you **then**.
s2: Okay, later.

With respect to the type of chain (identity or similarity), most of the chains found in the corpus are of identity, because the same element is repeated and referred to very often. This holds true even despite the low numbers of reference itself: the speakers achieve identity by mere repetition. The identity of the chains depends on the text and the context. The elements hold together much more closely because of the context. The identity of *Tuesday* with any date is only true in the context of a calendar. Again, this is a characteristic of spoken discourse, since spoken discourse is not meant to be repeated or read again—except for, maybe, by the inquisitive linguist.

I will conclude this section with a few remarks on the cohesive harmony of the dialogues. We saw, in Section 2, that cohesive harmony is a description of the cohesion and coherence of text. A text's cohesive harmony is established by high degrees of chain interaction and by ratios of relevant to peripheral tokens. Hasan (1984) also establishes that harmony is maintained if there are no breaks in the chain of interaction. The example above, a typical one, illustrated the very low degrees of interaction in the chains, and how major chains in the text do not interact with each other at all[4]. The scheduling genre seems to be characterized by a process of initiating and abandoning cohesive chains, unlike narrative, for instance, where characters and situations remain constant.

Two explanations are possible at this point. The first one is that spoken language, and particularly scheduling dialogues, have very low or non-existent degrees of

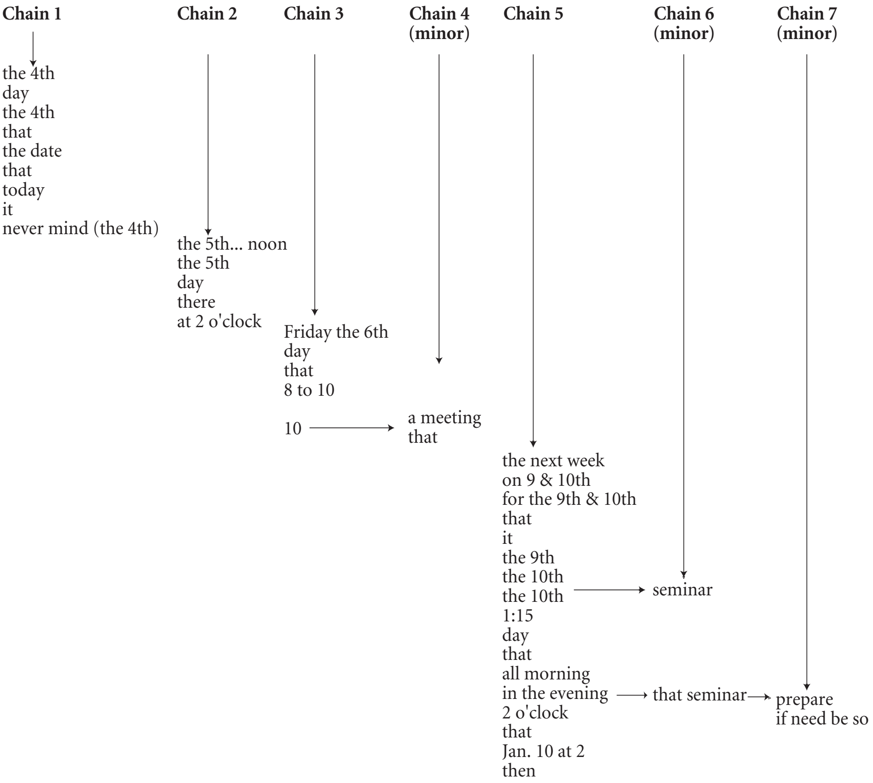

Figure 1. Cohesive chains in Example (8).

cohesive harmony. But these texts are functionally appropriate. The speakers created them for a particular purpose and, given the satisfaction and agreements at the end of the conversation, the texts have fulfilled that purpose. The second explanation points to the need for different measures of cohesive harmony. We might have been relying on measures that apply to narrative and expository texts, whether written or spoken. It could be the case that we need different measures of cohesive harmony for different genres.

4. COHESION AND STAGING. The conversations in this corpus, as instances of a genre, are divided in three main stages: Opening, Task-Performance and Closing. The chains of cohesion, however, run throughout the text. It is my intention in this section to show how the chains behave differently in each of the stages.

Most Openings are short in both languages. The Opening is considered to be over as soon as the speakers start negotiating a date. As a consequence, there are no chain-related elements in an Opening. Example (9) contains the first two turns of a Spanish dialogue. The Opening is over after the first period, that is, immediately before speaker s1 mentions the need to meet. The first chain begins with the mention of a date (*lunes veinticuatro de mayo*), which is picked up by the other speaker. This chain started two clauses into the Task-Performance stage. There is, then, no chain crossing over from Opening to Task-Performance stage. This is true of all the conversations in the corpus, and for both languages.

(9) **s1**: Bueno Patricia. Parece que tenemos que hacer otra reunión para terminar nuestro asunto. A ver si tiene algunas horas libres el lunes veinticuatro de mayo por la tarde.

s2: El lunes veinticuatro por la tarde va a ser difícil. Porque tengo una reunión...

s1: (Translation) Well Patricia. It looks like we need to have another meeting to finish our business. Let's see if you have some free hours on Monday the twenty-fourth of May in the afternoon.

s2: (Translation) On Monday the twenty-fourth it is going to be difficult because I have a meeting...

As for the Task-Performance phase, all the chains are initiated in it. As we saw in (8), some of them are abandoned for new ones, and some minor ones continue alongside the major ones. The Task-Performance phase is the place where the chains are developed for the most part. This stage is composed of smaller substages, Date or Place Proposals. Since these substages involve the discussion of different dates, it is obvious that we will find a switch over to a new chain as soon as a new date is introduced and discussed.

The chains that originate in the Task-Performance phase do not always cross over into the Closing stage. If they do, they include links that represent the Closing elements in a chain, which include a restatement of the date or a demonstrative reference to it. There are, on average, exactly the same number of links in the Closing section in the Spanish and in the English dialogues: 2.33 links. These links *always* belong in the last major chain of the dialogue, and are most often instances of repetition (lexical cohesion) or demonstrative reference. Such is the case in (10), which contains the last two turns of a conversation. The Closing begins immediately after speaker s1 has accepted the date (*couldn't be better*). The last SDU in her turn repeats the date and the time that have been discussed previously in the chain (*eleven to one on the twenty-sixth*). Speaker s2 responds by referring to that time (*then*), an instance of demonstrative reference.

(10) **S1**: Couldn't be better. And then you know maybe if we if we're, over a little bit, you know, it would be okay. So, eleven to one, on the twenty-sixth.
S2: Sounds great. See you then.

The most interesting phenomenon regarding cohesion and staging is the presence and evolution of cohesive chains within the Task-Performance stage. Within the Task-Performance stage proposals for dates to meet are tossed back and forth until one of them suits both speakers. The different cohesive chains that run through the Task-Performance stage are closely related to the beginnings and ends of the Proposal stages. That is, a new Proposal initiates a chain, and the rejection or completion of the Proposal stage terminates that chain. If we look again at the chains in Figure 1, we observe that the major chains running through the text correspond to different Proposals. Minor chains do not correspond closely with Proposal stages, because they are supporting, or in close relation to, a major chain. Again, cohesive harmony is violated: there are whole parts of the text that do not interact at all with each other. Rather, non-interacting chains mark the transition from one stage to the next one.

The conclusion here is that we can predict a new stage given a new chain, and vice versa. We could use this knowledge in different applications, such as automatic recognition of stages for information retrieval. If we know that the participants in a conversation began a new cohesive chain, we can predict that they are in a different generic stage of that conversation. In the opposite direction, knowing that we have started a new stage usually means that anaphora resolution will take place within that stage, because references will usually be only to elements in the same cohesive chain.

5. CONCLUSIONS. This paper has presented a study of cohesion in a bilingual corpus. Cohesion is interpreted according to the Halliday and Hasan (1976) model. Some adaptation of that theory was necessary in the analysis of Spanish conversations. The most notable application revealed the questionable presence of substitution in Spanish.

The comparison of the number of cohesive links used for each language discovered exactly the same ratio (0.068) of cohesive elements to words in both English and Spanish. The types of cohesive elements that the speakers avail themselves of were also very similar in both languages. Lexical cohesion, and specifically the repetition of the same item, is the most widely used type. Lexical cohesion was followed by the use of reference.

In terms of direction of reference, both languages preferred anaphoric reference, with cataphoric reference occurring a very small percentage of the time. The anaphoras were most frequently mediated, that is, they entered into a relatively lengthy chain of elements. However, the links are often activated, making the distance between a link and its mediating element only slightly longer than four clauses. After mediated reference, in both languages, comes immediate reference. All of this shows that the speakers avoid establishing links between elements located far from each other. I argue that this is a characteristic of spoken language in general, and of this genre in particular.

Finally, and with regard to chains, there are also striking similarities between the two languages. Each conversation contains about four chains (4.43 in English and 4.00 in Spanish). Those chains rarely interact with each other, because one is abandoned as soon as a new one is initiated. This holds true for major chains involving times and dates to meet. There are also minor chains throughout the dialogues, which show slightly higher degrees of interaction. Although the Spanish dialogues contain lower numbers of chains than the English ones, those chains are lengthier (an average of 4.99 links in English versus 6.56 in Spanish).

I conclude with some remarks on the presence of cohesion according to the different stages. The Opening phases of the conversations did not establish cohesive links with the rest of the conversation, which contained the most number of links and chains. The Closings only contained an average of 2.33 links to the last major chain running through the dialogue, the same average for both languages. The Proposal stages, repeated within the Task-Performance stage, contain new cohesive chains, usually unrelated to other major chains. As a result, we can say that the presence of a new chain is a good index of a new Proposal stage.

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[1] Thanks to the Interactive Systems Laboratory and to Alex Waibel, its director, for permission to use the corpus.

[2] The transcripts include a number of conventions introduced by the transcriber, to reflect every sound produced during the conversation. For ease of reading, I have deleted most of them, only leaving some that seemed relevant: */hm/* and */um/* indicate a hesitation on the part of the speaker. Stretches of talk accompanied by laughter are surrounded by */begin_laugh/* and */end_laugh/*. *pause* indicates a period of time from 0.5 to 2 seconds with no sounds at all. Turns are simply marked as 's1' and 's2' to indicate 'Speaker 1' and 'Speaker 2'.

In addition, transcriber comments include intonation, marked with either a comma (,), a period (.) or a question mark (?) at the end of the corresponding section of speech. These markings do not reflect, nor are influenced by, sentence structure. The speaker may have the intonation of a statement whether he or she is, in fact, asking a question. He or she may have the falling intonation typical of the end of a sentence (reflected in a period) after a collection of words that do not, in any way, resemble a grammatically correct or complete sentence.

[3] Note that, in English, there is an ellipsis alternative to the substitution, further complicated with the shift of case, from *I* to *me*: 'Nobody knows her better than I/me'.

[4] Cohesive harmony has as prerrequisite the interaction of chains. Once interaction is established, a measure of central, non-central and peripheral tokens establishes the harmony level. Given the low interaction, I did not carry out the full analysis.

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RULE VS. ROTE IN JAPANESE VERB INFLECTION

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Human language is governed by rules[1], or regularities, as linguists have shown. On the other hand, anyone who has tried to learn a language in adulthood knows that much of the job is sheer rote memory. Rule and rote—how much does each contribute to language use, and how can we tell which is which?

One area of language that seems clearly divided between rule and rote is inflectional morphology. Languages like English, German, and Spanish have 100–250 irregular verbs each, including many that cluster into subclasses based on phonological similarity. According to many linguistic and psycholinguistic analyses of these languages, forms of regular verbs are generated by rule as needed, while for irregular verbs each individual form must be recorded in the mental lexicon, since no rule can generate them (or at least, no rule shorter than the list of the forms themselves). Thus, psycholinguistic studies of inflectional morphology have generally focused on differences between regular and irregular words, and have used these differences to test hypotheses about the relative influence of rules, analogy, and rote memory.

One such psycholinguistic tool is the 'nonce-probe' experiment, in which subjects are asked to inflect novel words which could not have been memorized, then the forms they produce are examined to see whether they seem to be the result of particular rules (defaults) or of analogy to existing words. Most such studies of nonce verbs have used stimuli which resemble some irregular verb or verb group to a greater or lesser degree (MacWhinney 1975, Bybee & Pardo 1981, Prasada & Pinker 1993). Many of these nonce studies report that a variety of forms was produced, occasionally so many that it resembled a 'random' process. Bybee & Pardo (1981), for instance, list 5–11 variants of each target form from only 22 subjects.

Since Berko (1958), who introduced the 'nonce-probe' task for use with children, and who used adults as the benchmark of correctness, it has been assumed that adult native speakers produce the regular paradigm perfectly. So Schnitzer (1996) was unusual in using nonce verbs which closely resembled the three regular paradigms in Spanish. His subjects had a 13–24% error rate in paradigm selection when asked for another form of these 'regular' verbs. Clahsen (1999), however, reported that nonce verbs modeled on the productive German paradigm elicited 97% canonical forms, in contrast to only 31% for the unproductive one.

1. Japanese verbs. Japanese shows practically no irregular verb morphology. Virtually all Japanese verbs belong to one of several perfectly predictable paradigms (see Table 1). However, the characteristics of these paradigms do not pattern like

Type	Gloss	Nonpast	+masu	Negative	Past	Presump	Condit
Type-1 verbs ('vowel-stem')							
		x-*ru*	***x***	**x-*nai***	**x-*ta***	**x-*yoo***	**x-*reba***
-eru	'eat'	*taberu*	*tabe*	*tabenai*	*tabeta*	*tabeyoo*	*tabereba*
-iru	'wear'	*kiru*	*ki*	*kinai*	*kita*	*kiyoo*	*kireba*
Type-5 verbs ('consonant-stem')							
		x-*u*	**x-*i***	**x-*anai***	**[various]**	**x-*oo***	**x-*eba***
-ru	'cut'	*kiru*	*kiri*	*kiranai*	*kitta*	*kiroo*	*kireba*
-tu	'wait'	*matu*	*mati*	*matanai*	*matta*	*matoo*	*mateba*
-u	'buy'	*kau*	*kai*	*kawanai*	*katta*	*kaoo*	*kaeba*
-mu	'read'	*yomu*	*yomi*	*yomanai*	*yonda*	*yomoo*	*yomeba*
-bu	'call'	*yobu*	*yobi*	*yobanai*	*yonda*	*yoboo*	*yobeba*
-nu	'die'	*sinu*	*sini*	*sinanai*	*sinda*	*sinoo*	*sineba*
-ku	'write'	*kaku*	*kaki*	*kakanai*	*kaita*	*kakoo*	*kakeba*
-gu	'swim'	*oyogu*	*oyogi*	*oyoganai*	*oyoida*	*oyogoo*	*oyogeba*
-su	'lend'	*kasu*	*kasi*	*kasanai*	*kasita*	*kasoo*	*kaseba*
Defective Type-5 verbs							
aru	'be'	*aru*	'	*nai*	'	'	'
iku	'go'	*iku*	'	'	*itta*	'	'
nasaru	'do (hon.)'	*nasaru*	*nasai*	'	'	'	'
kudasaru	'give (hon.)'	*kudasaru*	*kudasai*	'	'	'	'
ossharu	'say (hon.)'	*ossharu*	*osshai*	'	'	'	'
gozaru	'be (hon.)'	*gozaru*	*gozai*	'	'	'	'
irassharu	'be (hon.)'	*irassharu*	*irasshai*	'	'	'	'
Irregular verbs							
'sa-hen'	'do'	*suru*	*si*	*sinai*	*sita*	*siyoo*	*sureba*
'ki-hen'	'come'	*kuru*	*ki*	*konai*	*kita*	*koyoo*	*kureba*

Table 1. Japanese verb paradigms. In all paradigms the past form *-ta/-da* shares the same base with the gerund *-te/-de* and the forms *-tara/-dara* and *-tari/-dari*. Imperatives and derived verbs (passive, causative, causative-passive) are omitted. The transcription system used is one that best rationalizes these relationships.

Spanish or English (regular = predictable+transparent+productive). In particular, productivity is harder to assess. Officially, very few new 'true verbs' enter the Japanese language[2]. Instead, the 'empty verb' *suru* 'do' is used to create new verbal expressions, such as *zerokkusu suru* 'to xerox'. More informally, and with lower frequency, new *-ru* verbs are created as slang words and short-lived nonce formations, like *memoru* 'to take a brief note'. The paradigm which is invariably used in these cases, here called the Type-5 paradigm[3], is less morphologically transparent (not easy to divide into stem and suffix), and shows more allomorphy, than the unproductive Type-1 paradigm.

Two previous studies used nonce verbs from some of these paradigms and found that, although the paradigms are regular and predictable, Japanese speakers did not reliably use them when faced with novel verb forms. De Chene (1982) performed an experiment with 10 native speakers of Japanese living in the United States. He trained them in a sentence-completion task like:

(1) *Asita issyo ni oyogoo; iia, mosi* *(oyogeba)*, *benkyoo ga dekinai.*
'Tomorrow let's go swimming together; no, if I swim, I can't study.'

Each sentence was read aloud and the subject supplied an appropriate form. Fifteen nonce verbs of Type 5 were used, but only five of them resembled actual verbs (*yubu*, *nebu*, etc.); the other 10 ended in *-zu* (*bazu*, *hayuzu*, etc.), unlike any real Japanese verb. De Chene also comments that a wide range of answers was observed.

Vance (1991) used a similar set of stimulus sentences, asking subjects to read the sentences silently on a printed sheet and circle one of three multiple-choice answers. Two forms of each nonce verb were modeled and then four additional forms were elicited. Four verbs were used: *homu*, *hoku*, *muru*, and *kapu*. The two best performers were *homu* and *muru*, each with about 28% error, but a number of confounding factors cloud the results.

2. PURPOSE. The experiments to be reported here explore the mental structure of several of the regular verb inflection paradigms in Japanese. We used the nonce-probe procedure to discover to what extent speakers can generate verb forms, as opposed to retrieving them from memory. Experiments on inflectional morphology have generally taken care not to 'bias' the subject's choice with information that would determine one particular paradigm, but we did the opposite, deliberately giving information sufficient to determine a particular paradigmatic form. In spite of this, as we will report, subjects did not always produce that form.

In designing our experiments, we aimed to improve upon previous work in several respects. First, we used contexts longer and more natural than short, paradigmatic phrases; we employed an aural/oral modality; and we gave the subjects free rein in creating response forms. Second, to be conservative, we avoided clearly unproductive paradigms (like *-mu* or *-bu*).

A series of three experiments is reported here. The first (Experiment 1) has some characteristics of a pilot study. Subsequently, we modified materials on the basis of results from the first experiment, and ran two more experiments simultaneously (Experiments 2A and 2B). These later experiments were completed only recently, so the results presented here must be considered preliminary.

3. EXPERIMENTAL DESIGN AND PROCEDURE

3.1. PARTICIPANTS. Adult native speakers of Japanese volunteered as subjects, mainly University undergraduates and graduate students, but also some persons from the community. Some subjects came as friends or acquaintances of the experimenters, while others volunteered in response to general outreach, presumably because they were interested in some aspect of the experiment itself.

3.2 MATERIALS. Subjects were exposed to sixteen different 'verbs,' each based on a two-mora stem (*gano-*, *nimi-*). We wanted stimuli that were long enough to be distinguishable and short enough to be remembered easily. All stems were phonologically legal as Japanese verbs, and were pretested to eliminate any that were too reminiscent of existing verbs. Each stem was used twice, varying both paradigm type and the form modeled (past or negative): for instance, *ganoranai* and *ganosita*. Each subject was assigned to one of two groups, List A or List B, and the sixteen stems were counterbalanced between the two groups with respect to the two variables (see Table 2 for an example of stimuli and counterbalancing).

Each stimulus 'verb' was embedded in a short (30 to 50 second) conversational frame involving one or two speakers which provided a context and/or definition for its nonsense 'verb.' In the conversation, the verb appeared four times—twice in its citation form and twice in another inflected form, either negative or past (*-nai* or *-ta*). The conversations were constructed so that the final 10–15 words would not contain any example of the verb, but would serve as a buffer between verb modeling and the experimental question. Following each conversation, either the *-nai* or the *-ta* form was requested from the subject: 'Please express the meaning "returned home" using the word *ganosuru*' (English translation of the question).

Each conversational frame was used twice, once in List A and once in List B, each time with a different stem, and all other stimulus characteristics were counterbalanced with respect to the two uses, resulting in 32 different items, 16 in each list. The order of presentation for each list was pseudo-randomized twice (a total of four groups), taking care to avoid more than two repetitions in sequence of a particular sub-condition, and to balance the number of instances of each sub-condition between the first half and second half of presentation order.

The sixteen conversation scripts (two versions each) and an additional practice conversation were recorded by eight student actors. Instructions and questions were recorded by a Japanese female speaker who took the persona of 'experimenter.' All of these recordings were digitized and stored on a Power Macintosh computer for later presentation.

3.3 PROCEDURE. Subjects were tested individually, seated in front of the computer, with two small microphones nearby. A microphone connected to the Mac served as a voice key to control the experimental software. Another microphone connected to a minidisk recorder recorded the entire session[4]. An experimenter stayed in the room and recorded the subject's answers in writing, which were later confirmed from the recording by another experimenter (one of the two was a Japanese native speaker).

Instructions were given by a recording played under software control. The experiment was introduced as intended to explore what kinds of new verbs are easy to learn, and the form of the questions was illustrated and explained. While the subject listened to each conversation, a line drawing illustrating the situation appeared on the computer screen. At the end of each conversation, a recorded question asked the subject to produce an inflected form, and the subjects responded by voice.

Frame	A List heard	A List target	B List heard	B List target
N1	*monisinai*	*monisinai*	*gemiranai*	*gemitta*
N2	*ekenai*	*ekenai*	*napisinai*	*napisita*
N3	*bemiranai*	*bemiranai*	*gumesinai*	*gumesita*
N4	*zoiranai*	*zoitta*	*bubesinai*	*bubesinai*
N5	*nimisinai*	*nimisita*	*gibiranai*	*gibiranai*
N6	*bedesinai*	*bedesinai*	*mibenai*	*mibeta*
N7	*nodesinai*	*nodesita*	*ganenai*	*ganenai*
N8	*gebenai*	*gebeta*	*megisinai*	*megisinai*
T1	*napitta*	*napitta*	*ekesita*	*ekesinai*
T2	*gumeta*	*gumeta*	*bemisita*	*bemisinai*
T3	*mibesita*	*mibesita*	*bedeta*	*bedenai*
T4	*megitta*	*megiranai*	*gebesita*	*gebesita*
T5	*gemisita*	*gemisita*	*monitta*	*moniranai*
T6	*ganesita*	*ganesinai*	*nodeta*	*nodeta*
T7	*bubeta*	*bubenai*	*zoisita*	*zoisita*
T8	*gibisita*	*gibisinai*	*nimitta*	*nimitta*

Table 2. Counterbalanced stimuli and groups for Experiment 2B.

	Experiment 1	Experiment 2A	Experiment 2B
Stem endings	*-i* / *-o*	*-i* / *-e*	*-i* / *-e*
Conjugations	*-ru*-5, *-suru*	*-ru*-5, *-ru*-1	*-ru*-5, *-ru*-1, *-suru*
Stimulus types	*iru* (5) *oru* (5) *isuru* (*su*) *osuru* (*su*)	*iru* (5) *eru* (5) *iru* (1) *eru* (1)	*iru* (5) *eru* (1) *isuru* (*su*) *esuru* (*su*)
Create/repeat	create only	create/repeat	create/repeat

Table 3. Summary of experimental variables

This procedure took about 20 minutes. Following the experiment, the subject supplied personal data on a written questionnaire, and then any questions from the subject were answered. Some subjects wanted to know if the verbs were real, and we told them they were not.

4. EXPERIMENT 1. This experiment used two contrasts. The conjugations varied between *-ru* Type-5 verbs and *-suru* verbs, the two productive verb formations in modern Japanese. Secondly, the stems ended in either *-o* or *-i*, which created a contrast within the *-ru* verbs: verbs ending in *-oru* can only be Type-5, while there are both Type-5 and Type-1 verbs which end in *-iru*. In all cases, subjects heard the base form and one inflected form (*-nai* or *-ta*) and were asked to produce a second inflected form, the one which was not heard[5].

Of 32 subjects, the responses of three were rejected: one person produced long sentences for each question, and two others used only or almost only *-ru*-type inflections. Another three subjects were not recorded properly due to experimenter error, leaving 26 subjects, 13 men and 13 women, aged 18 to 32, mean age 23.

	Percent of each answer type within condition			
Condition	Type-1	Type-5	*-suru*	Non-matching
-oru Type-5	—	**97.3**%	2.6%	2.6%
-iru Type-5	6.3%	**85.6**	8.1	14.4
-osuru	—	13.5	**86.4**	13.5
-isuru	2.8	12.0	**85.2**	14.8
Average all *-ru*	3.1	**91.5**	5.4	8.5
Average all *-suru*	1.4	12.8	**85.8**	14.2
Average all conditions	2.3	52.5	45.2	11.3

Table 4. Experiment 1. Distribution of answer paradigms by target condition (percentage of matching answers is **bolded**).

The results of this experiment have been previously reported (Batchelder 1999), so I will only review them here. Answers mismatched to the target paradigm accounted for 10.1%, and other kinds of errors brought the overall error rate to 12.3%. For this definition of error, there was no main effect for either the *i/o* or *-ru/-suru* factors, but there was a significant interaction of the two (repeated measures ANOVA by subject, F(1)=5.8, p=0.024), apparently due to the much better performance of the *-oru* verbs over any of the other three types. This interaction was observed more weakly by item (factorial ANOVA, F(1)=3.49, p=0.072).

Rather than all types of errors, however, here we are primarily interested in the choice of conjugation paradigm. Each of the conversations contained unambiguous evidence as to conjugation class, so we will look at patterns of paradigm assignment, asking if misassignments were evenly distributed across conditions, or were biased in some way. Conjugation misassignments amounted to 11.3% overall, but the distribution of misassignments was not even, as shown in Table 4. Type-1 *-ru* forms were also produced, even though Type-1 *-ru* forms were not modeled in the conversations (though the instructions included a sample answer which demonstrated that *-iru* verbs have two possible conjugations).

The superior performance of *-oru* is perhaps not surprising, given its unambiguous paradigm membership, as mentioned above. One would think that *-suru* verbs would be similarly unambiguous and, since they are by far the most productive verb form in Japanese, we expected that they would have the least difficulty. However, this was not clearly the case.

5. EXPERIMENT 2A. Experiments 2A and 2B were designed and run together, using the conversation stimuli and methodology from Experiment 1, with a few changes. The *i/o* variable was changed to *i/e*, so stems were modified or replaced after another pretest for low associativity. We tried harder to avoid similar-sounding forms, although we think we were only partly successful. Other changes made in Experiment 2 were to shorten some of the dialogues, and to change a couple of the definitions to make them less error-prone.

The conjugations used were all *-ru*: *-iru* and *-eru*, each in Type-1 and Type-5 paradigms. In addition, a new variable was added: 'heard vs. unheard,' to test whether a

Condition	Percent of each answer type within condition Type-1	Type-5	*-suru*	Non-matching
-eru Type-1	**51.5**%	46.5%	2.0%	48.5%
-iru Type-1	**53.9**	42.2	3.9	46.1
-eru Type-5	18.8	**77.2**	4.0	22.8
-iru Type-5	20.4	**73.8**	5.8	26.2
Average all Type-1	**52.7**	44.3	3.0	47.3
Average all Type-5	19.6	**75.5**	4.9	24.5
Average all conditions	36.1	60.0	3.9	35.9

Table 5. Experiment 2A. Distribution of answer paradigms by target condition (percentage of matching answers is **bolded**).

combination of internalized rule and experience (hearing the new form before having to produce it) would result in a higher success rate. For each subject, half of the target forms were the same as those heard in the conversation, while the other half had to be generated as in Experiment 1.

Subjects were assigned, as they arrived, alternately to Experiment 2A or 2B. Of the 29 who participated in Experiment 2A, three were removed from analysis: one person who did not understand the task and simply repeated the question, and two who used only one conjugation for the entire 16 items (in both cases, Type 5). Thus 26 subjects were analyzed, 15 females and 11 males, ranging in age from 18 to 67 (mean age 28.7), and 11 were personal connections, 15 were self-selected. Of the resulting 416 answers, 9 were omitted: 3 no-responses, and 6 ending in *-ru*, which could not be coded as a choice between Type-1 and Type-5 paradigms.

The most important results are shown in Table 5. Type-5 responses were used more often than Type-1, and appeared in the matching environment more often (ANOVA by item, F(2,32)=14.32, p<.001; by subject, F(2,26)=7.298, p=0.0125). Type-5 accounted for over 75% of their own environments as well as 44% of the Type-1 environments. Put another way, although half of all items had Type-1 environments, only about one-third of all answers were Type-1 forms. Type-5 answers intruded into inappropriate contexts more than twice as frequently as did Type-1 answers. Additionally, a few *-suru* forms crept into the responses, despite the fact that this form was modeled here only in the training question.

We had hypothesized that Type-1 *-eru* verbs would be more successful than Type-1 *-iru*, since they include the important and productive class of derived verbs (*-(s)aseru*, *-(r)areru*, *-(s)aserareru*). However, if anything, Type-1 *-eru* verbs here were slightly more troublesome than the Type-1 *-iru* verbs, which are not productive. Apparently the *-eru* derived verbs occupy a different psychological category.

The heard/unheard condition showed a large effect, as expected (paired t-tests, two-tailed: by item, t(30)=4.058, p<0.001; by subject, t(25)=3.485, p=0.0018). When simply repeating a heard form, subjects produced the appropriate paradigm 71.6% of the time, compared to 56.7% when they had to create an unheard form (see Figure 1). Benefits of hearing were clearer in some subconditions than in others, but overall a considerable effect of experience and memory in mastering new verb forms in

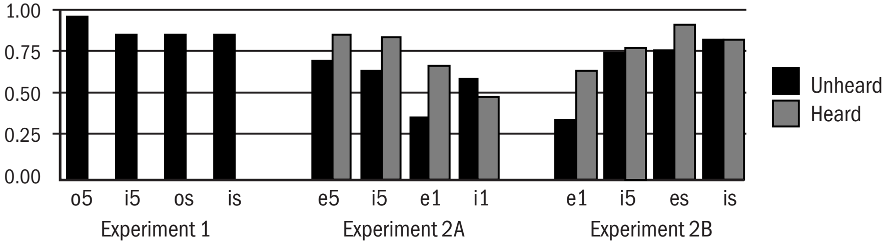

Figure 1. Mean matching paradigm rates (%) for heard and unheard trials in each target condition in three experiments.

Japanese can be seen. However, it is still somewhat surprising that, even after hearing a form twice, less than a minute later subjects did not reproduce the form, but chose another form instead, in 28.4% of the cases.

6. EXPERIMENT 2B. Experiment 2B again tested an *i/e* stem contrast, and continued the heard/unheard distinction, but three conjugations were modeled rather than two: half of the stimuli were *-suru* types (*-isuru* and *-esuru* equally), one-quarter were modeled as *-eru* Type-1 verbs, and one-quarter were *-iru* Type-5 verbs[6].

Subjects in Experiment 2B numbered 27, but the first subject's responses had to be discarded because of an error in counter-balancing which was noticed during the session. Of 26 subjects analyzed, 14 were women and 12 men, ages 19–62, mean 25.0 years. Nine were friends and 17 were self-selected during recruitment. Four items were omitted due to no response or an uninterpretable response, netting 412 answers for analysis[7].

The distribution of answers by paradigm is shown in Table 6. There was no difference between *-esuru* and *-isuru*, but there was a considerable difference between the *-ru* conditions, mirroring the result of Experiment 2A that the Type-5 paradigm was used much more than Type-1. An ANOVA model of matching answer rate by four factors and their interactions, by item, showed two main effects and one significant interaction: main effect of heard/unheard ($F(1,9)=7.96$, $p=0.02$) and of target condition ($F(2,9)=16.85$, $p<0.001$); and interaction of group and *-nai/-ta* target ($F(1,9)=11.05$, $p<0.001$). Nine paired t-tests by subject for proportions of answers by target environment all showed a significance level of $p<0.001$ ($t(25)$, two-tailed), except for two which were $p<0.05$ (Type-1 answers for Type-5 vs. *-suru* conditions, and *-suru* answers for Type-1 vs. Type-5 conditions).

It is noteworthy, however, that *-suru* was still more salient in its own environment than were either of the *-ru* paradigms. This may be at least partly due to the numerical dominance of *-suru* forms in these stimuli—half of the stimuli were from the single *-suru* paradigm, while the other half were divided between the two *-ru* paradigms. The fact that the proportion of *-suru* answers was similar to Experiment 1, in which the same condition obtained, is persuasive.

	Percent of each answer type within condition			
Condition	Type-1	Type-5	*-suru*	Non-matching
-eru Type-1	**49.5**%	44.7%	5.8%	50.5%
-iru Type-5	13.5	**76.9**	9.6	23.1
-esuru	1.9	13.6	**84.5**	15.5
-isuru	6.9	10.8	**82.4**	17.6
Average of all *-ru*	31.4	60.9	7.8	36.7
Average of all *-suru*	4.4	12.2	**83.4**	16.6
Average of all conditions	18.0	36.7	45.4	26.7

Table 6. Experiment 2B. Distribution of answer paradigms by target condition (percentage of matching answers is **bolded**).

Over all items, the heard condition outperformed the unheard condition in terms of matching answer paradigm (heard 80% vs. unheard 67%, ANOVA F(1,2)=7.96, p=0.02); this is shown in Figure 1.

7. DISCUSSION. The task was a simple one in terms of verb conjugation, but rather difficult when we consider all the various inputs that subjects had to juggle. Virtually all of the forms produced were canonical *-nai* and *-ta* forms of the modeled paradigms, with very few anomalous or invented forms, and there were no cases of exchanging or replacing the stem-final vowel.

There were some differences in task among the three experiments. Experiments 2A and 2B benefitted from the use of a kana representation of the stem on the screen, and from being able to hear the target form modeled in half of the stimuli. It is of interest that, considering these task differences and the different mix of stimuli, the answers were distributed across paradigms fairly similarly in all three experiments. In Experiments 1 and 2B, *-suru* verbs formed half of the stimuli, with *-ru* verbs the other half, and the two types of stems used with *-suru* in both these cases drew very similar proportions of *-suru* answers, 82–86%. Also, in both situations the proportion of *-suru* verbs that leaked into other environments was not significantly different—5.4% vs. 7.8%.

The Type-1 *-ru* verbs in Experiments 2A and 2B also performed very similarly, with appropriate answers of 53% and 50%, and the stem vowel did not seem to change matters much. Type-5 *-ru* verbs performed much better than Type-1 verbs—75% or higher. However, the difference between the two productive paradigms on the one hand (Type-5 and *-suru*), and the completely unproductive Type-1 verbs on the other, is a dramatic one, never less than 20 percentage points.

The better performance of Type-5 verbs in Experiment 1 over Experiment 2 is also noteworthy (91.5% vs. 75–77%). This may be due to the fact that in Experiments 2A and 2B both Type-1 and Type-5 *-ru* verbs appeared, which may have caused 'conceptual static' for many subjects, whereas when Type-5 was contrasted only with *-suru* verbs, as in Experiment 1, it was perhaps much easier for subjects to understand and manipulate. Anecdotally, we have the impression that many Japanese adults are not consciously aware of the existence of two *-ru* verb paradigms, and when they are confronted by both paradigms in this manner, they become confused and often resort to random assignment or rapidly shifting choice strategies.

In Experiment 1, the *-oru* verbs were more successful than *-iru* verbs, 97% to 85%, which we think is due to the greater cue validity of the *-oru* paradigm.

8. CONCLUSIONS. The results of these experiments show that the Japanese mental lexicon does not lean heavily on rule-like representations of the various verb paradigms, either consciously or unconsciously. If there were conscious rules, subjects would perform near 100% on these tasks. If rules were strongly present but unconscious, hearing the relevant form shortly before the question should result in implicit choices of the same forms at a high rate. The results of Experiments 2A and 2B demonstrated that even when repeating heard forms, there was a significant amount of paradigm mismatch.

So the Japanese mental lexicon does not lean on rules, but neither does it provide for analogic processes of creation of novel inflected forms based on various existing irregular verbs, like the English possible *bling*, *blang*, *blung*. Virtually no answers were produced other than a small set of canonical forms. Japanese verb inflection is less deterministic than would be expected from rules, but also less variable than expected from analogy. Thus, neither of the two contrasting inflectional processes which have been widely discussed as possible explanations of productivity is a good predictor of the performance of Japanese speakers.

Let us hypothesize about the cognitive path for the task of generating a past-tense form for the novel verb *napiru*. One path (conscious or unconscious) might be:

a. The conversation said *napiru*, *napinai*,
b. So *napiru* is a verb, and now I need the past tense,
c. Its paradigm must be: *napinai*, *napimasu*, *napite*, *napita*…,
d. Ah, past tense is *napita*!

This is the path that is usually assumed for regular verbs in English, German, etc. and it seems to account well for the 98%+ results obtained in those languages.

However, in Experiment 2A, in 42% of cases like that in the monologue above, the subject answered not *napita*, but *napitta*, which is not a possible outcome of that monologue. So, let's consider another ending for this train of thought:

c. Past tenses of a verb ending in *-iru* can be *-ita* or *-itta*,
d. Hmm, [pick one: *napita* / *napitta*] sounds better;

or even,

c. Past tenses of verbs end in *-ta* or *-tta*… or *-sita*… (or *-nda* or *-ita* or…),
d. Hmm, [pick one: *napita* / *napitta* / *napisita*] sounds better.

These latter two trains assume that Japanese verbs are organized not by conjugation but by the various possible target forms (in other words, as a syntagm rather than a paradigm), and one form is selected by some as yet undetermined procedure or influence. A rule-governed process should yield highly deterministic results, but the data presented here show that Japanese verb inflection performance is not very deterministic. Perhaps this is the 'product-oriented' process of Zager (1980) (cited in

Bybee & Moder 1983, and Kopcke 1988), a choice of one of several abstract schemas which reside in the mental lexicon.

The fact that Japanese speakers do not make these misassignments with 'real' verbs (or, no more than speakers of any language do) suggests that speakers do not use this limited-choice procedure with known verbs, but that all forms of existing verbs are lexicalized and thus avoid the frequently mismatched choices we have seen in this experimental data. This is a hypothesis that should be tested further.

Here it is sufficient to point out that Japanese, a language typologically distinct from most European languages, presents a perfect opportunity to learn more about the range of possibilities in human language and cognition. The ways that language design can interact with the organization of mental storage and the processes of language use may be more various than we have so far assumed.

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[1] The authors appreciate the collaboration and indispensable assistance of Reiko Sagiya in the planning and carrying out of this experiment. The Japanese conversations were created by Ai Satou, and the illustrations by Ken Matsuda, both then students at Tsukuba University. Nobuo Ohta, Ulrik Olofsson, and Terry Joyce contributed both moral support and material assistance on many occasions. EOB is indebted to the National Science Foundation for recommending her, and JSPS for supporting her during this research.

[2] Poring through the annual *Gendai Yougou no Kiso Chishiki* [Basic Knowledge of Current Usage, Tokyo: Jiyuu Kokuminsha] for any year turns up hardly any new non-*suru* forms, though other sources do cite some (list on request).

[3] The names Type-1 and Type-5 are adapted from the Japanese terms *iti-dan* and *go-dan*, the literal meanings of which are of only historical significance, but which are still current as labels for the paradigms.

[4] The original design included response time measurements, but subsequent analysis showed that this data was not correlated with any of the research issues, so it will not be discussed here.

[5] The counterbalancing procedure had several errors, so that 4 of the 16 verbs were inadvertently used twice with the same inflection (*-ta* or *-nai*), but the results do not seem to have been affected.

[6] Since both experiments were run concurrently (blame this on the exigencies of a short-term fellowship), the choice of variables for Experiment 2B was made before the results of Experiment 2A were known. We had expected, based on rough estimates of type frequency, that *eru*-1 and *iru*-5 would be stronger than *iru*-1 and *eru*-5, respectively, in Experiment 2A, but, as it turned out, they performed slightly worse, though the difference was not significant.

[7] All of the data were checked statistically to be sure that none of the experimental conditions had introduced bias. Experiments 1 and 2A showed no effects of group (List A/B), subject sex or age, sequence of presentation (first half vs. second half), stem, frame, or source of subject (friend or self-selected). For Experiment 2B, however, an item analysis gave indications of some significant effects of certain frames and stems, and an effect of group: List B had significantly more Type-1 answers, while List A had more Type-5s. The heard/unheard factor was not significant for List A, but the *-nai/-ta*

factor was, while List B showed the converse states. Further analysis will be necessary to determine whether the results are contaminated by these sources of bias. Here we include the main findings (cf. Table 6) separately analyzed for each group.

	List A				List B			
	Type-1	Type-5	-*suru*	Non-match	Type-1	Type-5	-*suru*	Non-match
-*eru* Type 1	**40.4**%	50.0%	9.6%	59.6%	**58.8**%	39.2%	2.0%	41.2%
-*iru* Type 5	11.5	**73.1**	15.4	26.9	15.4	**80.8**	3.8	19.2
-*esuru*	1.9	21.2	**76.9**	23.1	2.0	5.9	**92.2**	7.8
-*isuru*	7.8	11.8	**80.4**	19.6	5.9	9.8	**84.3**	15.7
Average	15.5	39.1	45.4	32.4	20.5	34.1	45.4	21.0

Also in Experiment 2B, males produced significantly more -*suru* forms than did females (52% vs. 40%, t(24), p=0.0281). However, since fewer males than females participated in the experiment, the effect of this bias would be to understate the already high proportion of -*suru* answers.

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LEXICON À LA MODE

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Thrift shops throughout the United States are museums of various fashions that have swept the nation: macramé hanging baskets, shag carpets, polyester leisure suits, cabbage patch dolls, Ataris, Nintendos, and many others. At one point each of these items was perceived nationally as new, interesting, progressive, or fun, and their owners enjoyed the feeling of being up-to-date and in-the-know.

Words and phrases can be items of fashion too, giving their users the same kind of pleasure and assurance. For instance *segue*, used in English in musical contexts since the eighteenth century, generalized in the early twentieth century to mean also 'any type of transition'. In the mid-1990s in the United States *segue* in this generalized meaning burst into popularity and could be heard on late-night television talk shows and read in popular magazines like *Modern Maturity*. It had become fashionable.

The phenomenon of fashion, particularly as observable in clothing, has been extensively analyzed and interpreted by anthropologists, sociologists, psychologists, and literary theorists. Language scholars have acknowledged the role of fashion in individual lexical items but generally have not considered fashion as any more than one, small curious factor that contributes unsystematically to the shaping of the lexicon. Yet in the current period of unprecedented mass communication, fashion is becoming an increasingly important factor in lexical motivation and use in American English. This paper briefly summarizes the concept of fashion as developed in other disciplines and then gives examples of two types of vocabulary that seem particularly to be vehicles of linguistic fashion—vogue words and slang.

An extensive literature analyzes fashion as a social, aesthetic, and economic force in human life, though fashion in language is scarcely mentioned in it[1]. From the perspective of the person who accedes to fashion, the two most generally recognized purposes are identity and status. The identity at issue in fashion is the individual's identity within the larger society. Fashion offers a means to express both uniqueness and willingness to conform to a group, appealing to the sometimes conflicting human needs of isolation and union with others. Individuality is shown by choice of the new or by imaginative deviation from the established. Conformity comes about by imitation. Adopting a new and approved fashion can make someone feel attractive, interesting, distinctive, or noticeable. Such effects lead some interpreters to think that the fundamental motivation of fashion is to attract the opposite sex, making fashion, then, a peculiarly human adaptation of the showy behavior that other animals engage in to insure continuation of the species.

Fashion also functions in the individual's struggle for status, for fashion is a device for competition. One way to assert equality with another is to imitate the other, taking as one's own the visible symbols of the superiority of the other, most easily observable in the acquisition and display of clothing or possessions. In order to maintain social distance, however, those being imitated then have to adopt new visible signs of superior status. As a result, fashion serves contradictory ends, permitting social distinctions to constantly and simultaneously both narrow and widen.

The quest for individual identity and status through fashion often has important economic consequences for society at large. Fashion is wasteful. New styles emerge while old styles are still usable. Goods are taken out of use and perhaps discarded not because they are worn out , unattractive, or no longer fit but because they are no longer in fashion. Consumers exchange money for the assurance that the goods they are buying have not met the test of time and are impermanent.

The process of fashion—how a fashion gets started and how it spreads—can be compared with the way that any innovation diffuses through society (Laurer & Laurer, 1981:12–16; Brenninkmeyer, 1963:77–79). Innovators and early adopters are generally attuned to and influenced by the mass media. These leaders of change then spread the innovation throughout the social networks in which they move. Interestingly, fashion leaders are found in various social classes. The direction of diffusion can be vertical, from upper to lower or lower to upper classes, or horizontal, across groups that cohere in ways other than by socioeconomic category. Another characteristic of the process is that some fashions tend to be cyclic. They tend to disappear and to come back into popularity again, though the form that reemerges need not be identical in all respects to the earlier one. For instance, hemlines of women's skirts raise and lower. For men, shoulder length hair, crew cuts, and shaved heads have all had their periods of popularity, as have beards and moustaches.

Fashion also reflects the interests and values of the age that embraces it. For instance, everyday work that used to be done by the strength of human bodies is increasingly performed by machines, and many people lead sedentary lives. Maintaining a physically-fit and healthy body has become a national, if not international, obsession, and people who achieve in competitive athletic and sporting activities that challenge the limits of the body are rewarded by riches and fame. Clothing first associated with physical activities—like athletic shoes, bicycling shorts, baseball caps, rugby shirts, and sweat pants—has become costly and fashionable, often bought and worn by those who are merely spectators of physical activities.

In the United States today, all forms of social interaction, including language, have been moving in the direction of informality. Laborers' denim overalls have become expensive designer fashions. Baseball caps are seen everywhere out of doors, and most wearers do not feel compelled to remove them indoors. Few restaurants enforce a coat-and-tie dress code for men or a no-pants policy for women. Many offices have designated Friday as 'dress down day' when employees eagerly wear jeans, tennis shoes, and tee-shirts to work. Conventions and colors of table settings are more varied and creative. Receiving lines at wedding receptions have been replaced by the happy couples' circulating among the guests, and at large banquets the head table with the diners awkwardly facing the entire assembly is disappearing. Informality is the prevailing style.

In her synthesis of the views of disparate disciplines, Joanna Finklestein (1996) says, 'In the name of fashion, a multitude of influences can be seen at work, and these affect the ways people think and act both privately and publicly' (7). Two manifestations of fashion in linguistic choices are vogue words and slang.

Vogue word is the term used by Thomas J. Creswell and Virginia McDavid in a prefatory essay in *The Random House Dictionary of the English Language* (1987) to describe new combinations or new senses of existing words that come to prominence very quickly from non-jocular uses in government, business, education, entertainment, and the like. 'Vogue expressions demonstrate that their users are socially or professionally with it' (xxiii). David Crystal makes the connection with fashion specific, characterizing vogue words as 'lexemes which take on a fashionable or cult status' and pointing out that the alternative term *buzz word* 'in some ways, is a more appropriate term, with its suggestion of excitement, activity, and change—the features of any fashion' (179). Crystal also expresses the widely shared impression that such words and expressions are usually not completely new or unknown but that suddenly everyone is using them (179). Vogue words that I became aware of in the 1990s include *segue*; *in the loop*; *on the same page*; *mentor/mentee*; *proactive*; *student-centered classroom*; *soccer mom*; *postmodern*; *schmooze*; *-driven*; *extreme*; *message* (verb); and *wake-up call*. The recentness of some of the combinations makes some, for instance *soccer mom*, neologisms; but others, for instance *schmooze* (first attested in English in 1897), are not recent, merely recently popular. Others, like *wake-up call* and *on the same page*, have been in use for decades in their literal senses but have recently come to the fore with more general and abstract meanings.

A type of vocabulary similar to vogue words—though one that often is more irreverent and more socially precarious —is slang. No type of vocabulary gets outmoded more quickly than slang.

Like fashion, slang helps users to establish and maintain identity in a social setting. Slang usually identifies members of a particular group. Yet some slang indicates knowledge of contemporary currents in popular and widespread culture rather than affiliation with a particular group. If expressions like *channel surf* 'use a remote control device to sample television programs quickly', *chick flick* 'film that appeals to females', *go postal* 'lose control, act insane', and *senior moment* 'temporary loss of thought or memory' can be considered slang at all, they are a kind of national slang and say little or nothing about group identification. Robert Chapman calls this kind of vocabulary *secondary slang* (as opposed to the *primary slang* of groups) and predicts that in the future it will be the major type of slang in the United States (1986:xii). Often it is difficult to distinguish secondary slang from vogue words.

Americans today who characterize 'something excellent' as *tubular* or 'something repulsive' as *grody to the max* reveal themselves to be behind the times, stuck culturally in the era of Valley Girl chic of the mid 1980s. A decade later in the late 1990s, under the influence of urban African-American music and styles, *phat* and *da bomb* became favored terms for 'excellent' among adolescents and young adults, and *skanky* and *ghetto* meant 'unappealing'. Ever-changing fashionable vocabulary of this sort is usually a deliberate alternative to more stable neutral terms that are already available to speakers—just as items of fashion are usually redundant. For instance, *tubular* or *phat* can be paraphrased with words from the general vocabulary like *excellent* or *exceptionally good*. Yet, in totality of meaning, *tubular* and *phat* are not equivalent to *excellent* and *exceptionally good*, just as a tee-shirt that says *Go Tar Heels* is not equivalent to one that says *Tommy Hilfiger* or *FUBU*, though all function equally well to cover the torso. Like fashionable clothing, slang words send social signals that their conventional counterparts do not. Their use can show what group or what trend in the larger culture a speaker is identifying with or can convey an attitude of extreme casualness, flippancy, or irreverence.

Again like fashion, many items of slang exhibit peaks of popularity and can trigger immediate associations with the era of their use. As an expression of enthusiastic approval, *the cat's pajamas* is associated with the roaring 1920s, *groovy* with the drug culture of the late 1960s, and *awesome* with the surfing and Valley Girl image emanating from California in the 1980s (Dalzell:1996). Also like fashion, old slang can reemerge with renewed vigor. The adjective *hot* 'sexually attractive' is abundantly documented from the 1920s as used by males to refer to females. Its popularity soared again in the more gender-egalitarian 1990s, this time just as likely used by females to refer to males and giving rise to *hottie* for 'good-looking male; boyfriend'. Commonly, one slang term yields to another. Thus, as *the pits* fell out of favor, *sucks* came in, e.g., 'This weather sucks.' As with fashion, in a set of equivalents, value accrues to the newest version.

Speakers who use slang need never resort to bland, neutral, or unremarkable vocabulary. American slang today shows the elements of fresh appeal required by fashion. Aside from the primary slang of counter-cultural groups in which age is often not a factor, slang is associated with youth or with an effort to project a youthful image. Adolescents and young adults don't attempt to be cool by imitating the behavior, styles, or vocabulary of the middle-aged and elderly. The direction of imitation is the opposite. Although older people may be the models and arbiters of standard language use, young people are the purveyors of slang. And they get much of it from subcultures. Vocabulary from subcultures strikes outsiders as novel, rich, and imaginative. It suggests a way of life with greater fun and excitement than the well-regulated lives of most. Adopting the vocabulary of a subculture is a way of sharing vicariously in the daring while remaining apart from what might be unsafe or objectionable about the way of life. In the USA at the end of the twentieth century, it is the hip-hop scene developed by African Americans that is the alluring subculture, and rap music is the primarily vehicle of the incipient international youth culture spreading across the planet.

Language use reflects the prevailing informal approach to social interaction. Rarely in spoken American English is formal discourse more appropriate than informal. Even in discussions of the most pressing problems facing the United States conducted in highly structured formats, informal vocabulary occurs frequently. The weekly program *Washington Week in Review* features four prominent journalists interpreting the important events of the preceding week for the public television audience. The subject matter is important and serious, and the panelists have expert knowledge. Yet the interchange between participants gives the impression of casual friendliness, and informal vocabulary peppers the discussion. For example, commenting on the coming congressional election, David Broder said, 'California is the odd-man-out in this election' (October 16, 1998). And Mara Liason described the State of the Union address as 'a speech to the nation and Congress that said, "I ain't going nowhere"' (January 22, 1999). From Gwen Ifill, about the special prosecutor's investigation that was to lead to the impeachment of the President of the United States, 'No one expected them [Democrats] to bring up the dread M[onica]-word' (August 7, 1998). Discussing advertising by tobacco companies, Elizabeth Arnold said, 'The tobacco industry isn't going to belly up to the bar and say, "We're going to pull Joe Camel"' (September 5, 1997).

The rapid development of technology during the twentieth century quickly expanded the means of disseminating a national popular culture and its fashions, making the national spread of vogue words, slang and other ephemeral vocabulary possible. By the 1990s the alliance of technology and marketing made the fashionable vocabulary of the United States a sign of being in-the-know throughout the world.

In his 1997 essay 'Social Factors in Language Change,' William Bright enumerates several of the same issues that writers about fashion have addressed, for example, the role in phonological change of identification with or loyalty to a particular group and the role and direction of imitation in the diffusion of linguistic innovation. In a call for seeing the large picture similar to Finklestein's characterization of fashion quoted above, Bright closes his essay with this suggestion: 'Progress must be made not by collecting linguistic facts and looking for linguistic correlates—or even by collecting sets of correlations between linguistic and social facts—but by attempting to formulate a comprehensive viewpoint in which scholars can deal with linguistic and social aspects of communication simultaneously, as indeed we all do in our everyday lives' (91).

The appeal of fashion in the choices people make is too widespread and pervasive to ignore. The fashion sense that influences people to acquire and abandon possessions also influences them to adopt and discard vocabulary (and probably sounds). This paper claims that fashion is part of the comprehensive viewpoint that Bright envisions, particularly in lexical matters.

[1] An accessible summary of research for a general audience is found in *Fashion Power: the Meaning of Fashion in American Society* (Prentice Hall 1981), by Jeanette C. Lauer and Robert H. Lauer.

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AN EMPIRICAL TEST OF ANALOGICAL MODELING: THE /K/~Ø ALTERNATION

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1. CONSONANTAL ALTERNATIONS IN TURKISH[1]. The final consonants of many Turkish stems display two different forms, depending on the surrounding phonological context. For example, it is very common for stem-final voiceless obstruents to become voiced when followed by a vowel-initial suffix (Lewis 1967, Sezer 1981, Inkelas & Orgun 1995):

(1) a. *kalip* 'mold' → *kalip-lar* 'mold-PLUR', *kalib-a* 'mold-DAT' (Inkelas & Orgun 1995)
b. *kurt* 'worm' → *kurt-tan* 'worm-ABL', *kurd-u* 'worm-3SING.POSS' (Sezer 1981)
c. *ağaç* 'tree' → *ağaç-ta* 'tree-LOC', *ağac-ın* 'tree-GEN' (Lewis 1967:31)

However, stem-final velar stops behave quite differently. Final /k/ does voice to /g/ in some borrowed words, but only after /n/. In all other stem-final contexts, both /k/ and /g/ either remain as they are or disappear entirely. The typical pattern is for the velar to delete intervocalically[2].

(1) d. *yatak* 'bed' → *yatak-lar* 'bed-PLUR', *yatağ-i* 'bed-3SING.POSS'
kelebek 'butterfly' → *kelebek-ler* 'butterfly-PLUR', *kelebeğ-i* 'butterfly-3SING.POSS'
filolog 'philologist' → *filolog-lar* 'philologist-PLUR', *filoloğ-u* 'philologist-3SING.POSS'

This conditional deletion of stem-final velars is known in the literature as the */k/~Ø alternation* (Zimmer & Abbott 1978, Sezer, 1981, van Schaaik 1996, Kibre 1998) or as *velar drop* (Inkelas & Orgun 1995). There are some known exceptional cases to the /k/~Ø alternation, where velar deletion does not apply. The majority of these cases fall into two categories (see Sezer 1981)[3]:

1.1. EXCEPTIONAL CLASS 1: MONOSYLLABIC STEMS. The first class of exceptions involve monosyllabic stems of the pattern (C)VK, where both voiceless and voiced velar stops are retained intervocallically, as in (2)a. The same pattern of exceptions may be observed in monosyllabic roots generally, where the voicing does not alternate as noted above—both with voiceless ((2)b) and voiced ((2)c) final consonants. Inkelas and Orgun (1995) report that 87% of monosyllabic roots resist final-consonant alternations. We see, then, that this class of exceptions is a strong tendency, but it itself is not a firm exceptionless rule.

(2) a. *kök* 'root' → *kök-e* 'root-DAT' but **köğ-e* **kög-e*
ek 'affix' → *ek-e* 'affix-DAT' but **eğ-e* **eg-e*
lig 'league' → *lig-i* 'league-3SING.POSS' but **liğ-i*
füg 'fugue' → *füg-e* 'fugue-DAT' but **füğ-e*
(Inkelas & Orgun 1995)[4]
b. *at* 'horse' → *at-i* 'horse-ACC'
koç 'ram' → *koç-u* 'ram-ACC' (Inkelas & Orgun 1995)
c. *öc* 'revenge' → *öc-i* 'revenge-ACC'
ud 'oud' → *ud-u* 'oud-ACC' (Kibre, 1998)

1.2. EXCEPTIONAL CLASS 2: WORDS WITH A LONG VOWEL BEFORE THE FINAL /K/. It seems from (2) that the preservation of the final velar may just be a special case of a general resistance to alternation in monosyllables. But the situation is not that simple. There is another class of words, the vast majority of which have been borrowed from Arabic or Persian sources, that have an 'underlyingly' long vowel before the /k/. This vowel is usually shortened before a consonant in the coda (as seen here in the base forms), but regains its length when the /k/ is re-syllabified before a vowel-initial suffix.

(3) *merak* 'curiosity' → *mera:ki* 'curiosity-3SG.POSS'
tahkik 'verification' → *tahki:ki* 'verification-3SG.POSS'
tetkik 'investigation' → *tetki:ki* 'investigation-3SG.POSS' (Sezer 1981)

1.3. VARIOUS ACCOUNTS OF THE /K/~Ø ALTERNATION. The /k/~Ø alternation and these two classes of exceptions have been accounted for in several ways. Zimmer and Abbott (1978) and Sezer (1981) postulate a rule that deletes final /k/ after a vowel in polysyllabic words. I present a modified version here:

(4) $\mathrm{K} \rightarrow \emptyset \,/\, \mathrm{VC_0\breve{V}}\_\_ + \mathrm{V[+denominal][+native]}$

Inkelas and Orgun (1995) essentially agree with Sezer's analysis, but they seek to provide principled justification for it. For the first class of exceptions, Inkelas and Orgun cite a language universal proposed by McCarthy and Prince (1986), the bi-moraic minimal size condition, which prevents C_0VC roots from being further shortened by rules such as velar deletion. Inkelas and Orgun's analysis does not explicitly account for Sezer's second class of exceptions[5].

Van Schaaik (1996:113), on the other hand, seems to reject the notion of 'exceptional classes' governed by rules. He argues that the alternation and all its exceptions may be most elegantly accounted for by means of lexically stored 'archiphonemes'

/G/ → **{g,Ø}**, **/K/** → **{k,Ø}**, which are phonetically underspecified in the lexicon and realized according to the phonological surroundings. This analysis avoids the problem of finding theoretically justifiable rules to account for every word. However, it also fails to account for the productive nature of the /k/~Ø alternation. Zimmer and Abbott (1978) note that the /k/~Ø alternation applies not only to native words, but also to recently borrowed words:

(5) *frikik* 'freekick' → *frikiği* 'freekick-3SG.POSS' (Zimmer & Abbott 1978).

Furthermore, their experimental evidence suggests that the /k/~Ø is both productive and psychologically real. Zimmer and Abbott describe two psycholinguistic surveys testing the productivity of the /k/~Ø alternation, in which native speakers were asked to attach the vowel-initial suffix to various nonce-words. Their surveys included monosyllabic 'stems' (Exceptional Class 1 [EC-1]), and several examples of 'Arabic-sounding' stems, including one example of a long final vowel (Exceptional Class 2 [EC–2])[6]. Although their results reveal some variation among speakers, they do show that most speakers tend to behave in accordance with Sezer's rule (item (4), above). Zimmer and Abbott report a clear correlation, significant to the .05 level, between number of syllables and /k/ deletion. Since nonce words cannot be supposed to exist *a priori* in a speaker's lexicon, these data seem to indicate the presence of a word-independent phonological rule or tendency, contrary to van Schaaik's assertion. Van Schaaik's strictly lexical approach therefore seems less plausible from a psycholinguistic standpoint, since it does not account for Zimmer and Abbott's data.

Sezer's rule is in part well supported by Zimmer and Abbott's experimental data, and elegantly accounted for within Inkelas' and Orgun's theory. But only in part. For monosyllables (EC-1), it provides a benchmark by which other approaches may be measured. Any alternate theory must account for the productive velar-retention of monosyllables. However, Sezer's second exceptional class—words with long final vowels before /k/—has not been adequately shown to be a productive rule, either in theory or empirically. The one nonce word of this type in Zimmer and Abbott's study was judged to retain the velar by only 55% of the informants. Further data from the TELL lexicon (see below) also shows considerable variation among words of this type, even in one individual's idolect.

In short, there seem to be two general ways to account for these exceptional classes. One, represented by Sezer (1981) and Inkelas and Orgun (1995), which proposes more fine-grained rules to handle these exceptions. The other, represented by van Schaaik (1996), assumes that these exceptions are entirely lexical in nature. We have seen that both approaches encounter some difficulty. Nicloas Kibre, discussing the application of the dual-route model to Turkish final-consonant alternations, observes this same dilemma. The exceptional classes are too regular to be listed as exceptions, yet too irregular to be fully described by rules. He proposes that only a system that recognizes a continuum between regularity and irregularity will be able to account for final consonant deletion (1998).

A number of approaches meet Kibre's requirement for such a continuum of regularity. Kibre himself suggests a schema-based model incorporating 'family resemblance' and other ideas from lexical connectionism (1998). A relational network approach such as Stratificational Grammar may also be appropriate to the task[7]. Exemplar-based approaches constitute another class of alternatives to the 'rule-plus-exception-list' approach, and furthermore have working implementations that can be empirically tested. I will here consider an exemplar-based approach known as Analogical Modeling of Language (Skousen 1989). I believe that an exemplar-based model can account for both the productive regularity of monosyllables (EC-1) and the variation in long-voweled polysyllables (EC-2).

2. ANALOGICAL MODELING OF LANGUAGE.

2.1. A BRIEF DESCRIPTION OF THE APPROACH. Like other exemplar-based approaches to language, Analogical Modeling of Language (AML) rests on the assumption that speakers do not rely on a finite set of rules in order to perform some operation on a word, such as attaching a suffix to a word. Instead, a speaker remembers examples of similar words with that suffix attached, and bases his performance on the examples in his memory. Usually, an instance of the 'target word' itself will be remembered (if it is a relatively common word), and that remembered instance will be applied. For example, if I want to add the plural suffix to the word *log*, I remember (subliminally) the last time I heard the plural of *log* as [lagz], and model my own performance after it. But supposing I should forget the plural of *log*. I could still come up with a good 'guess' by remembering that *dog* becomes [dagz], *leg* becomes [lɛgz], etc., and applying the plural used in the majority of these neighboring words.

However, suppose I were to forget the plural of *ox*. This is unlikely for an adult speaker, since *ox* is not a very rare word. But if I did, I would probably remember *ax* → [æksəz], box → [baksəz], etc., and come up with the 'wrong' plural—but the same plural one would expect from applying a rule. As this example suggests, the AML model predicts that common exceptional words (like *ox*) will retain their irregular forms, but that rare words will eventually be forgotten and re-analyzed by analogy with similar forms.

Unlike pure nearest neighbor approaches, which base their predictions solely on the *n* nearest neighbors to the target word in question, AML creates on the fly an 'analogical set' of variable size for the target word in its given context, consisting of (1) classes of examples that are the most similar to the target word (nearest neighbors), and (2) more general classes of examples which behave like those nearest neighbors. This second class allows for what Skousen calls the *gang effect*: many words which are part of a larger regular pattern may be included in the analogical set—even if they are only marginally similar to the word in question—as long as there are no closer words which behave differently. This allows the more common patterns, such as the /-s/ or /-z/ plurals in English, to apply to nearly any unremembered word, creating a rule-like regularity across a large part of the lexicon. The probability of a word being chosen as an 'exemplar' for the target form in a given context

X depends on three properties: a. the similarity of the occurrence to the given context X; b. the frequency of the occurrence; and c. whether or not there are intervening occurrences closer to X with the same behavior (Skousen 1989:4).

Unlike many rule approaches and connectionist systems, Skousen's model allows for multiple possible outcomes for an operation on a word. Each possible outcome has a probability associated with it, derived from the proportion of exemplars in the analogical set which use that outcome. Random selection from a set of 'activated' exemplars accounts for the variation inherent in real-life language. It also accounts for the possibility of 'changing one's mind', or producing several guesses—for example, when trying to pronounce an unfamiliar last name (see Skousen 1989:84–85). Since the speaker has several possible outcomes at his or her disposal, he or she may try one, decide against it, and then try another. Most deterministic, rule-based approaches do not allow for such multiple guesses.

2.1 THE CREATION OF A LEXICAL DATA SET FOR PREDICTING THE /K/~Ø ALTERNATION. Since AML bases its predictions of an operation on the outcomes of similar words, the application of AML to any particular problem requires the creation of a suitable model of the mental lexicon—or at least that small subsection applicable to the problem. In this case, an appropriate subsection of the lexicon would include noun stems ending in /k/ or /g/. It could also be expanded to include all noun stems ending in any obstruent (/p/, /b/, /t/, /d/, /č/, /ǰ/, /k/, /g/), although the words without final velars would be expected to play a less crucial role.

In order to model a subset of the Turkish mental lexicon, I extracted data from the Turkish Electronic Living Lexicon (TELL), developed by Dr. Sharon Inkelas at the University of California, Berkeley. TELL was compiled from two editions of the Oxford Turkish-English dictionary, a telephone area code directory, and an atlas of Turkey. The 30,000 resulting lexemes were elicited, in various morphological contexts, from a 63-year old native speaker of a standard Istanbul dialect. The native speaker knew and supplied pronunciations for some 17,500 of the elicited lexemes[8]. Of the 1511 velar-final nouns found in the lexicon, 1440 are reported as 'used' by the informant, and 71 are reported as 'not used' by the informant. Other than this classification, there is no information regarding word frequency in the TELL database. Nevertheless, the informant's classification of words as 'used' and 'not used' provides a simple way of deciding which words are common (and therefore likely to be remembered) and which are uncommon (likely to be constructed by analogy). Accordingly, those items labeled 'used' were used in constructing the lexical dataset. Those labeled 'not used' were used as test items, to see if the AML algorithm would predict for them the same outcome as was supplied by the informant. Two additional word lists were tested: a list of Arabic loan words with long final vowels, taken from Sezer (1981), and the second nonce test from Zimmer and Abbott (1978).

The TELL database provides three different types of vowel-initial suffix for most words: the definite accusative ('the X.ACC'), first person singular possessive ('my X'), and 'predicative' or copulative ('I am an X'). Each word was appears up to three times in the lexical data set, once for each attested suffix. If an entry was (for whatever reason) missing one or more of these suffix fields, those instances of the word were omitted from the database (so as not to invent data not present). This may have resulted in a word receiving less 'weight' than its neighbors, having only one or two instances in the data set instead of three. This weighting seems justifiable—if the informant is unable to provide a form for all three fields, it may not be frequently used with all three suffixes, and that this gap ought to be reflected in the data set.

When an entry had two alternate entries for the same suffix (e.g., *infilak* + PRED → *infilak-ım*, *infila-ım*) one of each copy was saved. Essentially, this resulted in a duplicate copy of the same variable set, but with different values for the outcome, and therefore, 'opposing weights'.

2.2. THE VARIABLE ENCODING SCHEME. In Analogical Modeling, the similarity or 'nearness' between two words is determined by the number of variables for which the two words have identical values. Conversely, the number of non-matching variables determines 'distance' from the given context. Unlike rule-based approaches AML itself does not determine *a priori* which of the potential variables are significant—enough variables are included to give as complete a picture of the surrounding context as possible, within the constraints of the system. Although several different variable sets were tested, the basic set of variables for this project was as follows:

(1) The first phoneme of the word
(2–4) The onset, nucleus, and coda of the first syllable (for words of two or more syllables)
(5–7) The onset, nucleus, and coda of the second syllable (for words of three or more syllables)
(8–10) The onset, nucleus, and coda of the last syllable (not including the /k/ or /g/)
(11) The last phoneme of the word stem (for all test items, this was either /k/ or /g/)
(12–14) The vowel-length of the first, second, and last syllables (long or short)
(15) The etymology (if known) of the word stem (Turkish, Arabic, Persian, or other)
(16) The suffix being added to the stem (accusative, possessive, or predicative)

I will illustrate with the disyllabic word *akik* 'oppression of humidity' (Table 1). The vowel in the last syllable is underlyingly long, but it only appears as long with vowel-initial suffixes. In citation form the vowel is shortened before word-final /k/, characteristic of words in EC-2, but the TELL informant seems to have trouble remembering this word's final vowel length, pronouncing it long with only two of the three suffixes listed. Thus the word is borderline between the second exceptional class and the normal case. In this particular word the informant's decision to retain or delete the velar depends on vowel length, as predicted by Sezer.

The beginning of the line (up to the first comma delimiter) is the 'outcome' of the word, as given by the informant. In this data set there are three possible outcomes: delete the velar, voice the /k/ to /g/, or leave it the same. The informant retained the velar (same) with the accusative and predicative suffixes, but deleted it for the 1st-person possessive suffix.

Outcome	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Comments
same ,	a	0	a	0	=	0	=	k	i	0	k	.	=	_	null	accs,	akik → aki:ki
delet ,	a	0	a	0	=	0	=	k	i	0	k	.	=	.	null	poss,	akik → akiim
same ,	a	0	a	0	=	0	=	k	i	0	k	.	=	_	null	pred,	akik → aki:kim

Table 1. AML Encoding of *akik* ‘oppression of humidity’.

The next portion contains the sixteen variables. The first phoneme of the word (1) is /a/, and the onset, nucleus, and coda of the first syllable (2–4) are *null*, */a/*, and *null* respectively. The slots for the second syllable (5–7) are *null*, since the second syllable is also the last syllable. The onset and coda (5,7) are *predictably null* (=), since the absence of the syllable is already coded in the *null* nucleus (6). The onset, nucleus, and coda of the last syllable (7–10) is */k/*, */i/*, and *null* (counting the final /k/ (11) as syllabified in the same syllable as the suffix). The vowel length of the first syllable (12) is *short* (.), the second syllable’s vowel length (13) is *predictably null* (since there is no corresponding syllable), and the final syllable (14) is *long* (_) twice and short once. The etymology (15) is unknown (NULL), and the suffix (16) is either *accusative*, *possessive*, or *predicative*. The final part of the line indicates the base and suffixed forms. It is not used by the algorithm itself, but provides identifying information to the user.

3. TESTS RUN ON THE AML DATA-SET. The first test consisted of the 71 velar-final words which the TELL informant claimed not to use in everyday speech. These should qualify by definition as ‘uncommon’ words and therefore make excellent test cases, as they are not likely to be remembered as their own exemplars.

These 71 words were split into three categories, each tested separately:

1) Words for which all three suffixes uniformly deleted the final velar.
2) Words for which all three suffixes uniformly retained the final velar.
3) Words where the informant kept the velar on only one or two of the suffixes.

The first subset were all polysyllables ending in $VC_0\check{V}k$, the pattern predicted by Sezer to always delete. Within the second subset there were seven monosyllables: three of the pattern CVK (EC-1), three with the pattern CVCK, and one CV:k. There were two polysyllabic words with the pattern $VC_0V{:}k$ (exceptional case 2), and thirteen polysyllables ending in $\check{V}C_0Vk$. This retention of the velar is contrary to Sezer’s predictions; therefore, these words seem to form a third and previously unknown group of exceptions. The third subset consisted entirely of polysyllables ending in $\check{V}C_0Vk$. Their behavior (or this informant’s usage) is also wrongly predicted by Sezer’s rule, since he predicts that all three suffixes should behave identically.

The second test consisted of twelve words taken from Sezer (1981), exemplifying EC-2. All were of Arabic origin and had a long final vowel followed by a /k/. These were tested in three ways: treating the final variable as long, treating it as short, and ignoring the final vowel-length altogether. (The latter two turned out to have equivalent results.) They were also tested with and without the etymology variable, to isolate its effect.

The final test run was the second nonce experiment from Zimmer and Abbott. All these words were coined by the experimenters. They include ten examples of EC-1 (C_0VK), one example of EC-2 (VC_0V:k) and three other examples of 'Arabic sounding' words. These last three, and the remainder of the words, are polysyllables of the pattern V$C_0\breve{V}$k. In Zimmer and Abbott's nonce experiment, each 'word' was inflected according to Sezer's predictions by a majority of the subjects.

4. DISCUSSION OF RESULTS

4.1 RESULTS OF THE THREE TESTS. In the first test, all of the words with deleted final velars (including all of subset 1, and about half of subset 3) were predicted correctly, with little average leakage. All monosyllables (EC-1) were also predicted correctly. These are the two classes of words where Sezer's rule was shown to be productive. Thus, the AML algorithm meets the benchmark set by this portion of Sezer's rule.

In the second test, all twelve of Sezer's examples for EC-2 were predicted to retain the velar when the final vowel was treated as long and the etymological variable was present. Eleven out of twelve (all but *ahla:k* 'morals') were predicted as velar-retaining without the etymological variable, and nine out of twelve when the final vowel was treated as short or ignored, with or without the etymological variable. (*Ahlak*, *infilak* 'explosion', and *ittifak* 'alliance' were predicted to delete when final vowels were ignored.) It seems clear that the vowel length does play a factor in the retention of the /k/, as Sezer predicts. However, it may not be a crucial variable, for it appears that some of the words can be correctly remembered as /k/-retaining even without the knowledge of vowel length. This seems to be the situation with our informant. He is unsure of the proper vowel length of several words (e.g., *istimlak* 'expropriation'), reporting them as both long and short, but retains the /k/ in both cases. For him, vowel-length and final-/k/ retention are not completely connected—both exceptional features are gradually being lost, but the latter more slowly than the former.

Ten of Sezer's twelve examples were present in the data set, and most of these were highly dependent on being 'remembered' to retain the /k/. Only *istintak* 'interrogation', *istihkak* 'merit', and *inhimak* 'inclination' showed a 'stable' final /k/ without the final long vowel, probably due to the number of Arabic loan-words beginning with *inC-* and *isti-* that keep the final /k/. Furthermore, the two 'uncommon' words in this category (*misak* ~ *misa:kım* 'solemn promise, pact' and *revak* ~ *reva:kım* 'porch, pavilion') failed to be predicted as /k/-retaining without the long final vowel. Therefore, the AML model predicts that only common words are likely to remain /k/-retaining in a dialect that has lost vowel length distinctions. Over time, the words would be regularized to follow the patterns described by Sezer. We see that process in action in two of the 'missed' words, *infilak* and *ittifak*. The informant has already lost the long final vowel for both of these words, reporting them as short. *Infilak* is present in the database not once but twice—once with final /k/, and once without—for all vowel-initial suffixes. *Ittifak* is reported without the final /k/ in all cases. In light of this data, Sezer's generalization describes a constellation of words, but not necessarily a productive rule. We see here that in this informant's idiolect, this exceptional class is gradually being lost. AML correctly predicts both the direction of the change and its gradual, word-by-word progression.

In the third and final test, the nonce experiment, 21 of the 24 words were predicted 'correctly' (i.e., as the majority of the subjects had them), and three were missed (*ruk*, *müstemek*, and *mok*). This is not remarkable, for about half of the subjects also 'missed' three or more of the twenty-four items. It seems likely, especially upon inspection of the TELL database, that our informant would do the same, for his own performance shows significant variation from Sezer's predictive rules, as we will see.

4.2. AN UNANTICIPATED EXCEPTION: VELAR-RETAINING POLYSYLLABLES WITH -V̌K.

There is a final category of exceptional words which has not yet been directly addressed. This 'other' category of exceptional words is both the largest and the least expected, for it violates both Sezer's rules and the results of Zimmer's experiment. About 434 out of 3645 instances of commonly used VCV-K words, or 11.9%, exceptionally retain the /k/ in our informant's usage. Unlike all other categories seen so far, these exceptions are numerous—nearly as numerous as all the rule-predicted /k/-retaining instances combined. These exceptions are not evenly distributed among the three grammatical cases. Over half the instances are the 'predicative' case; the accusative accounts for roughly one quarter of the instances, and the possessive about one sixth. This is totally unaccounted for in the above-mentioned rule-based accounts, which predict that all suffixes of this type should behave the same with respect to velar retention, a trend even more pronounced among uncommon words.

These 'exceptional' words were also mispredicted by the AML algorithm, with very large leakages. These may be true exceptions, but it seems odd that they should be so numerous, and that so many should all be labeled as 'not used'. There seems to be no common link between them: several, like *almanak* 'almanac' and *mihanik* 'mechanics', are clearly loan words. But others, like *benlik* 'egoism', are clearly native (though perhaps neologisms). Some are marked as /k/-retaining in the Oxford Dictionary, others are not. The cause (or causes) of these exceptions is still unknown.

5. IMPLICATIONS OF THE RESULTS: LEXICAL EXPLANATIONS FOR THE DATA.

5.1. MONOSYLLABLES (EXCEPTIONAL CLASS 1).

According to Skousen's theory large numbers of similar words, grouped 'close together', as it were, in the lexicon, can draw the words around them away from a more general pattern. All words of the pattern C_0VCK retain the velar as a matter of course, by virtue of the consonant adjacent to the velar. Nevertheless, because they are similar in length and sound to the C_0VK monosyllables, they may easily influence them. If this analysis is correct, the number of syllables is important—not because of a constraint, but because of the distribution of nearby words. The 159 instances of monosyllabic velar-retaining C_0VCK stems form a 'gang' sufficiently large to influence the 137 instances of the (phonologically similar) monosyllabic C_0VK stems. Thus the C_0VK stems will be pulled towards retaining the velar like their C_0VCK neighbors. However, the 86 instances of polysyllabic VC_0VCK stems are too few to influence the 3645 instances of polysyllabic VC_0VK, which remain velar-deleting.

It has been suggested that the 'exceptional' retention of velars in CV-K monosyllables is due to a bi-moraic minimality constraint (Inkelas & Orgun 1995). No evidence has been found in this study to refute this position, and I see no reason to discount it as a possible factor. However, the results obtained from this study suggest that there are alternate explanations, or at least other possible factors. It is possible that the 'exceptional' behavior of monosyllables simply arises out of the distribution of words in the lexicon as described above. Alternatively, it may be that a universal tendency and analogical factors have combined to create and maintain the current 'exceptional' pattern.

5.2. POLYSYLLABLES WITH LONG FINAL VOWELS (EXCEPTIONAL CLASS 2). The explanation for the second exceptional class is not as straight-forward, and may possibly involve socio-linguistic factors. It may be that the vowel length fills the coda, making these stems equivalent to the velar-retaining VC_0VCK stems. However, Zimmer and Abbott (1978) have suggested that it is not just the vowel length of the last syllable, but the 'Arabic sound' of the whole word which encourages the retention of the final /k/. Originally, when Arabic was a language of prestige and culture in Turkey, Arabic words would be pronounced as close to their original Arabic pronunciation as possible. This conservatism would prevent the application of 'native' sound changes such as the /k/~Ø alternation. Eventually, some Arabic words will have been regularized into Turkish pronunciation patterns, as their origins are forgotten. But since phonemic vowel length is not a feature native to Turkish, a phonemically long vowel (if preserved) would signal the foreign status of the word and encourage the retention of the velar.

Political climates change, and Arabic-like pronunciation of (now) Turkish words is perhaps no longer a symbol of prestige. However, in those dialects where vowel length is preserved, a sufficient number of these words have remained in current use to reinforce one another and retain their velars, regardless of their etymology. Tests with Skousen's AML algorithm confirm that, when vowel length is allowed as a factor, it will predict the preservation of final /k/ for nearly all of Sezer's examples. Without vowel length, most of the common words are still correctly predicted. Uncommon words tend to be regularized, unless they contain other salient 'Arabic' features, such as beginning with *inC-* (as in *inhimak*) or *isti-* (as in *istimlak*, *istintak*, *istihkak*). Kibre (1998) suggests that a variety of phonological features, none obligatory, may serve to identify a word as Arabic. The results generated by AML seem to confirm his claim.

5.3. VELAR-RETAINING POLYSYLLABLES ENDING IN V̆K. The last group of exceptions is as yet unaccounted for, both by rule-based approaches and by AML. As the TELL lexicon is expanded and refined, these exceptions may prove to reflect the idiosyncrasies of one speaker, or artifacts of the process of building the lexicon. But if the same variations are manifest in other speakers also, then more work will be needed to explain these phenomena.

6. conclusion. Skousen's Analogical Modeling of Language is seen here to predict the particulars of the /k/~Ø alternation in Turkish to a fairly high degree of accuracy. It reaches the 'benchmark' set by the rule systems proposed by Sezer (1981) and Inkelas and Orgun (1995) with regard to monosyllables, the first class of exceptional words. This suggests that rule-based approaches with strict divisions between regular and irregular categories are not necessary to explain certain morpho-phonological patterns. Rather, these patterns may possibly emerge from the lexicon through mutual analogical influence between lexical items or exemplars.

AML also provides additional insights into the second class of exceptional words, polysyllables with final /k/ preceded by a long vowel in the last syllable. Whereas Sezer's account made no distinction between the productivity of these two exceptional classes, Analogical Modeling shows the second class to be much weaker than the first, and subject to regularization into the velar-deleting norm. This prediction accords with the variation in the informants' responses to Zimmer and Abbott's nonce example, as well as the variable data encountered in the TELL lexicon.

However, there is still work to be done. Neither the current model under AML nor the rule systems proposed to date are adequate to fully describe the performance of the TELL informant. A closer examination of the TELL database revealed a third class of exceptions, as yet unexplained by rule approaches or by AML. This class of exceptional words, if it may be so called, does not appear to have any distinguishing characteristics that would make it amenable to a rule-based approach. If similar variations are found in other speakers, then a more refined model in the AML paradigm will be necessary to capture this type of variation. Nevertheless, by accounting for the variation in the second exceptional class, AML comes closer to descriptive adequacy than deterministic rule-based approaches.

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[2] Orthography in this paper generally follows standard Turkish orthography, where the following sound correspondances apply: ç = /č/; c = /ǰ/; and ğ = Ø, /γ/, or lengthening of a preceding vowel, depending on dialect. I have assumed in this paper the ğ = Ø correspondance, which is found in most standard dialects. In addition 'V:' is used to mark long vowels (indicated only sporadically in traditional orthography), 'K' is used to represent velar consonants (/k/ and /g/), 'V̆' is a short vowel, and C_0 is zero or more consonants.

[3] Sezer also addresses another exceptional class: roots plus verbal or 'non-native' affixes:

meslek 'profession'	*mesle-im* 'profession-1sg.poss'	*meslek-i:* 'profession-al'
na:zik 'kind'	*na:zi-im* 'kind-1sg.copula'	*na:zik-en* 'kind-ly'

I have not addressed this exception in my research to date, assuming these words to be stored as separate lexical items. For the time being I am restricting my inquiry to inflectional morphology.

[4] Lewis (1967) and Sezer (1981) make note of three common lexical exceptions to this global exception: *çok* 'many', *yok* 'there is not', and *gök* 'sky'.

[5] They account for Sezer's exceptional class (note 3) by assuming that Turkish words go through multiple levels of representation between the 'deepest' lexical level and the phonetic realization, and that certain rules such as velar drop are only applicable at certain levels. The suffixes in the other exceptional class attach sooner than the native denominal suffixes, before the velar drop rule is active. The exceptions in note 4 are handled by lexical prespecification.

[6] They did not test the exceptional class in note 3, which they evidently took to be a given.

[7] This possibility was suggested by anonymous reviews of a previous draft.

[8] Taken from http://socrates.berkeley.edu:7037/AboutTELL.html as of 30/7/1999.

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THE FUNCTIONAL DEFINITION OF THE WORD AND WORD-BASED SYNTAX

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I propose a word-based syntax that is antithetical to orthodox theories of syntax, concerned with the logical analysis of the sentence. Let me start with defining the word.

A word is a minimal linguistic sign that is capable of having various syntactic functions either (1) by itself or (2) together with a word of type (1), both types meeting the condition of discreetness.

'Minimal' means that the word is the smallest linguistic sign that satisfies the condition of discreetness. For instance, in the word *unrepeatable* its components *repeat* or *repeatable*, meeting the conditions of discreetness, might be isolated, but as neither *un-* nor *-able* meet these conditions, we are compelled to leave *unrepeatable* as an integral discreet whole. I use the term 'paradigm' in the sense of 'the class or classes of units occurring in an identical syntactic position' accepted by linguists working in the semiotic research tradition. This meaning of the term 'paradigm' should not be confused with the ordinary meaning of this term in morphology.

A word of type (1) I call an autonomous word; a word of type (2) I call a *non-autonomous word*.

Let us take some examples: *run*, *runs*, *ran*, *run*, and *running* are different forms of the same autonomous word RUN, because they signify different syntactic or paradigmatic functions, and RUN is invariant of changes in its syntactic functions and forms. (The small capital letters of RUN mean that it signifies an abstract word, that is, a class of different forms of a word.)

The Russian word KNIGA 'book' has the following forms, signifying various syntactic functions: *kniga* ('book', nominative singular), *knigi* ('of the book', genitive singular), *knige* ('to the book' dative singular), *knigu* ('the book', accusative singular), *knigoi* ('with the book', instrumental singular), *(o) knige* ('[about] the book', prepositional singular), *knigi* ('books', nominative plural), *knig* ('of the books', genitive plural), *knigam* ('to the books', dative plural), *knigi* ('the books, accusative plural), *knigami* ('with the books', instrumental plural), and *(o) knigax* ('[about] the books', prepositional plural).

Let us compare these forms with their English equivalents, for example, genitive singular *knigi* and the English prepositional phrase *of the book*. Although the English preposition *of* corresponds to the genitive singular suffix *-i* of *knigi*, *of* cannot be considered a suffix because it is separable from *the book*. Owing to separability, the preposition *of*, like other prepositions, assigns syntactic function not only to nouns but to noun phrases, as well: compare *of the book*, *of the large book*, *of a very interesting large book*. By contrast, inseparable case suffixes assign syntactic functions only to the words of which they are an integral part. The preposition *of* is a word of type (2), that is, a non-autonomous word.

Under the above definition of the word, autonomous words are verbs, nouns, adjectives, adverbs, pronouns, and interjections; non-autonomous words are prepositions, articles, particles and conjunctions. Autonomous words are classified into words having a representational function—verbs, nouns, adjectives, adverbs, pronouns and words having an expressive or vocative function—interjections (such as *oh*, *wow*, or *hey*).

Autonomous words having a representational function are classified into words having a contensive function (verbs, nouns, adjectives, adverbs) and words having a deictic function (pronouns). By the contensive function I mean the direct representation of elements of reality whereas by the deictic function is meant pointing out these elements.

Non-autonomous words are: prepositions, conjunctions, articles, particles.

Hierarchically, non-autonomous words occupy an intermediate place between autonomous words and morphemes: they function like morphemes, but are discreet like autonomous words.

Discreetness is the characteristic feature both of autonomous and non-autonomous words. Words, both autonomous and non-autonomous, are minimal discreet signs—they are syntactic atoms from which all complex syntactic units, sentences included, are built. This is why words are units central to language.

Autonomous words divide in independent and dependent ones. An independent autonomous word indicates its syntactic relations to other words in a sentence either by its lexical content or by syntactic morphemes it contains. A dependent autonomous word does not contain syntactic morphemes, neither its lexical content indicates its syntactic function; to function as a part of a sentence it needs support from prepositions or particles or support from the position it occupies in a sentence indicating its syntactic relations to other words. The English word *today* is an example of an independent word that indicates its syntactic function by its lexical content; and the English word *John's* is an example of an independent word which indicates its syntactic function by the syntactic morpheme *-s*.

Simple dependent autonomous words, e.g., *cat*, *wolf*, *walk*, *swim*, look like lexical morphemes, but they are words, not morphemes. Each of these words consists of a lexical morpheme plus a zero grammatical morpheme. Hence, oppositions: *cat* + *Ø* : *cat* + *s*, *walk* + *Ø* : *walk* + *ing*, *walk* + *ed*, etc.

In accordance with the distinction of syntactic and paradigmatic functions of an autonomous word and with the distinction between basic and derived autonomous words we must distinguish two classes of non-autonomous words:

1. Modifiers (non-autonomous words defining paradigmatic functions of dependent autonomous words).

2. Relators (non-autonomous words defining syntactic functions of dependent autonomous words).

Dependent autonomous words are those which in themselves do not carry a mark of their function in the sentence, such as *house* or *sky*. Relators—words such as *with* or *for*—are meant to indicate the syntactic functions of dependent autonomous words. Modifiers are words such as articles *the* or *a*—they are meant to indicate the paradigmatic functions of dependent words.

The proposed functional definition of the word does the following:

a. It establishes an essential hierarchy by drawing a distinction between autonomous words, which have representational functions, and non-autonomous words, whose functions is identical with the functions of inflectional morphemes.
b. It conceives of the autonomous word as an abstract unit with all its syntactic and paradigmatic functions expressed by its different forms. For example, *walk*, *walks*, *walking*, and *walked* are not four different words but four different forms of one word, WALK.
c. It provides an independent characterization of the autonomous word in terms of its functions regardless of whether or not they have morphological markers.
d. Since the word is a discreet entity defined independently of the notion of the morpheme, it is the central unit of language. Morphemes are not sequentially organized primitive units, forming the word, but are properties of the word subordinated to it.

We must distinguish the *characteristic* and *complementary syntactic functions* of an autonomous word. Only the *characteristic* syntactic function of an autonomous word is essential for its formal characterization.

What are *objective*, that is, *formal* criteria for a distinction between the characteristic and complementary syntactic functions of an autonomous word? The answer to this question is formulated as the following law:

> *Law of Syntactic Superposition*. Every autonomous word is defined by the opposition of its paradigmatic function and a characteristic syntactic function as follows: (1) noun: term, (2) adjective: attribute of a term, (3) verb: predicate, (4) adverb: attribute of predicate. If in a given context **C** a word **A**, having characteristic syntactic function **F**, takes on the characteristic syntactic function **G** of a word **B** on top of its characteristic syntactic function as its complementary function, a syncretic syntactic function **<F qua G>** is formed. We say that **F** and **B** are **superposed** in the syncretic syntactic function **<F qua G>**, and we call the operation of forming **<F qua G>** the **superposition** of **F** with **G**.

As examples, consider the noun *gold* in the following phrases:

(1) a. Gold is yellow.
b. gold watch

In (1)a the noun *gold* functions as subject and in (1)b it functions as attribute of a noun. Now consider the adjective *brave* in (2):

(2) a. The brave man came.
b. The brave entered the burning building.

In (2)a, the adjective *brave* functions as an attribute of a noun, and in (2)b it functions as subject. Nouns and adjectives seem to behave in a similar way: in some contexts they fulfill the role of subject, in other contexts, the role of an attribute of a noun. If we classify nouns and adjectives as polymorphic, then we must admit that their polymorphism is identical and that nouns and adjectives are identical at the level of their phrasal projection. An analysis of the syntactic behavior of the four classes of the autonomous words shows that their syntactic behavior seems to be identical. If we classify autonomous words as polymorphic, then nouns, adjectives, verbs, and adverbs belong in the same class with respect to their syntactic behavior. This explanation of the syntactic ambiguity of classes of autonomous words would conflict with the generally accepted notion of these classes as morphologically and syntactically distinct entities. In search of a plausible explanation, we come up with the hypothesis of the hierarchy of syntactic functions assigned to each class of autonomous words. This hierarchy is explained by the Law of Syntactic Superposition.

Under the Law of Syntactic Superposition, the revised assignment of syntactic functions in the above examples is:

(1) a *gold*: characteristic syntactic function ‘subject’
b *gold*: complementary syntactic function ‘attribute of a noun’
(2) a *brave*: characteristic syntactic function ‘attribute of a noun’
b *brave*: complementary syntactic function ‘subject’

We see that differences between classes of autonomous words are characterized by different hierarchies of the characteristic and complementary functions of these classes. In our case, what is the difference between the class of nouns and class of adjectives? They may have the same syntactic functions, but what is crucial for determining the difference between the noun and the adjective is the hierarchy of the characteristic and complementary functions of the noun and the adjective: the characteristic function of the noun is the complementary function of the adjective, and, conversely, the characteristic function of the adjective is the complementary function of the noun.

This analysis reveals the opposition between the noun and the adjective: *the characteristic type of the noun is the complementary type of the adjective, and, conversely,* *the characteristic type of the adjective is the complementary type of the noun*. A word with a complementary syntactic function superposed on its characteristic syntactic function displays *duality*: it takes on the properties of the complementary syntactic function on top of its characteristic syntactic function but retains at least part of properties of its characteristic syntactic function.

The characteristic syntactic function of an autonomous word is *invariant* under a set of superpositions that determine its complementary functions.

It is useful to introduce the term ‘field’ to name the hierarchy of the characteristic and complementary syntactic functions of a class of autonomous words and of their intersections defined in terms of the concept of superposition. Every class of autonomous words is characterized by its syntactic field. A class of autonomous words is a paradigmatic concept, whereas the syntactic field is a syntactic concept. The important thing to note is that the notion of the field makes paradigmatics subordinate to syntax because classes of autonomous words do not have inherent characteristics independent of their syntactic functions. Syntactic functions precede all other characteristics of classes of autonomous words.

The concept of field obviates the widely held view that classes of autonomous words have certain intrinsic properties as opposed to their syntactic functions. Under the field view, classes of autonomous words are defined by their characteristic functions and complementary syntactic functions. A class of autonomous words is identified as a bundle of its characteristic and complementary syntactic functions.

Mutatis mutandis, we may draw an analogy between the electromagnetic and linguistic field. Just as in physics there is no principled difference between matter and energy, so in linguistics we have to recognize that there is no principled difference between class and function. In physics, we have the dualistic concept ‘matter-energy’. In linguistics we have to recognize the dualistic concept ‘class-function’. As matter is identical with a high concentration of the field energy, so are linguistic classes identical with intersections of linguistic functions.

We see that differences between classes are characterized by different hierarchies of the characteristic and complementary functions of classes. In our case, what is the difference between the class of noun and class of adjective? They may have the same syntactic functions, but what is crucial for determining the difference between noun and adjective is the hierarchy of the characteristic and complementary functions of the noun and adjective: the characteristic function of the noun is the complementary function of the adjective, and, conversely, the characteristic function of the adjective is the complementary function of the noun.

There is a strict correspondence between the form of the word and its characteristic and complementary syntactic functions. This correspondence, which constitutes an objective basis for a distinction between the characteristic and complementary syntactic functions of the word, is defined by the following law:

> *Law of Form-Function Correspondence*. If the change of the syntactic function **F** of the word **X** involves the change of the syntactic form of **X** into **Y** while the

> paradigmatic function remains the same, the characteristic syntactic function corresponds to the base form and a complementary function corresponds to a derived syntactic form.

The following example makes this clear. The only difference between Latin *amo* 'I love' and *amans* 'loving' is the difference between their basic and derived syntactic forms whereas their paradigmatic meaning remains the same in both cases. The basic form corresponds to the characteristic syntactic function of the Latin word AMO and the derived form to one of its characteristic syntactic functions. It should be noted that the basic and derived forms of a word are not necessarily differ by their phonic expressions. Difference between the basic and derived syntactic forms of the word can be represented by the differences of the range of occurrence of the word in one case and the other. This formal property is defined by the following law:

> *Law of Inverse Relation between the Range and the Load of the Sign*. The wider the range of the sign, the smaller its load; and, inversely, the larger the load of the sign, the narrower its range.

The range of the sign is the sum of its functional positions in the sentence. The load of the sign is the degree of the complexity of its function or meaning.

Superposition of types generates loaded signs, that is, signs that have one or more types superposed on their characteristic types. For example, any noun in its characteristic syntactic function of an argument of predicate can occur in three syntactic positions: as subject, direct object, and indirect object. But in its complementary function of an attribute it occurs only in one position—in the position of the attribute. It is true that an adjective can modify the three kinds of arguments of a predicate. But these three positions count as one position because the attributive function of the adjective is identical in all these positions.

The hierarchy of syntactic forms and functions of the word defined here is a step towards a theory of language differences. This hierarchy provides a basis for the question: How in any language of the world, be it English, Russian, or Chinese, the complementary syntactic functions of autonomous words are derived from their characteristic syntactic functions? The answer to this question will contain: 1) a description of the forms corresponding to characteristic syntactic functions of the word and 2) a description of formal processes, internal or external to the word, assigning complementary syntactic functions to it. The essential difference between languages of the world will be in the degree of the independence of the word from external markers of its complementary syntactic functions. Exploring this difference between languages, we find languages with internal markers of their complementary syntactic functions, like Latin or Russian, at one pole, and languages with external markers, like Chinese or Vietnamese, at the other.

The centrality of the word in language calls for a redefinition of the goals of syntactic theory which is of utmost importance for the progress of theoretical linguistics.

Orthodox syntactic theories base their linguistic analysis on the sentence and its components as a reflection of logic. As far as linguistic analysis is concerned, it is wrong to base it on the sentence as the basic unit of language. True, language has many aspects. What aspect of language a scholar looks depends on the principle of relevance. What is relevant for a psychologist, sociologist, or logician, is irrelevant for a linguist. Linguists must have their own principle of relevance in examining languages. The linguist must study language as a system of signs, hence the functioning of signs is the only relevant thing that must concern the linguist The fundamental signs of language are words—syntactic atoms, from which larger units are constructed. The sentence is a privileged combination of words; still it is only one of the possible combinations of words. In the foregoing section it was shown that autonomous words are defined by their characteristic syntactic functions in the sentence. But as we will see, the characteristic syntactic functions must in turn be defined not in logical terms but in specific linguistic terms. Syntactic theory must become a theory of word combinations. A presentation of an outline of such a theory is beyond the scope of this paper. We will only get a glimpse of how a word-based syntactic theory can be developed. The fundamental laws of word-based syntactic theory must be:

The Word Combination Law. This law is formulated recursively :

a. A word is a minimal discreet sign,
b. A minimal discreet sign is a discreet sign,
c. A discreet sign **A** with an incomplete meaning combines with a discreet sign **B**, whose meaning completes the meaning of **A**, to form a discreet sign **AB**. The discreet sign **A** is called the *determiner* of **B**, the discreet sign **B** is called the *determined* of **A**, and the discreet sign **AB** is called the *resultant* of the combination of **A** with **B**.

Examples: Verbs and adjectives are determiners with respect to nouns because meanings of verbs and adjectives are incomplete and are in need of supplementation by meanings of nouns. Consider *boy* or *paper*. The meanings of these nouns are complete. Take now *writes* and *yellow*. We ask: Who writes? What is white? The meanings of the words are incomplete. They need be supplemented by meanings of nouns such *boy* or *paper*: in *the boy writes* the verb *writes* is a determiner and *the boy* is its determined; in *white paper* the adjective *white* is a determiner and *paper* is its determined. Similarly, the meaning of prepositions is incomplete without supplementation by meaning of nouns, therefore prepositions are determiners with respect to nouns; in *on the table*, *on* is a determiner and *the table* its operand. The meaning of a conjunction is incomplete, it needs to be supplemented by the meaning of words belonging to basic word classes—nouns, adjectives, verbs, adverbs—or sentences; therefore a conjunction is a determiner with respect to expressions of all these classes: in *black and white*, *in* is a determiner with respect to *black* and *white*. We observe chains of meaning supplementations. Thus, in *John wrote his letter quickly* we observe the following meaning supplementations:

(a) wrote ← quickly,
(b) his → letter,
(c) (wrote ← quickly) → (his → letter),
(d) (((wrote ← quickly) → (his → letter)) → John).

The arrows between words denote the process of combining of determiners with their determinds: **X** → **Y** means 'determiner **X** combines with its determined **Y**'; **X** ← **Y** means 'determiner **Y** combines with its determined **X**'. Under (d), we observe a complete chain of meaning supplementations and, respectively, a chain of determiners and their determineds for the sentence *John wrote his letter quickly*. Thus *quickly* is a determiner and *wrote* its determined; *his* is a determiner and *letter* its determined; *wrote quickly* is a determiner and *his letter* its determined; *wrote quickly his letter* is a determiner and *John* its determined.

Now it is useful to introduce the concept of the constitutive structure:

> *The Constitution Law*. Given a binary combination **AB** of determiner **A** with its determined **B**, if the grammatical category of combination **AB** is different from the grammatical category of determined **B**, then determiner **A** is the constitutive component and determined **B**, the complementary component of the combination **AB**. If, on the other hand, the grammatical category of the combination **AB** is the same as the grammatical category of determined **B**, then determined **B** is the constitutive component and determiner **A**, the complementary component of the combination **AB**. The constitutive component can occur outside **AB**, without a co-occurrence of the complementary component, whereas the complementary component occurs only if the constitutive component co-occurs. If the constitutive component occurs outside the combination **AB**, then, the constitutive component takes on the function of **AB** on top of its proper function of the constitutive component of **AB**.

The Constitution Law is important because it determines the concept of dependence:

> *The Law of Dependence*. Given a combination of a determiner with its determined, the complementary component of the combination depends on its constitutive component because the complementary component can occur only if the constitutive component co-occurs whereas the occurrence of the constitutive component does not presuppose co-occurrence of complementary components. As terms the dependence relation, the constitutive component is called head and the complementary component, its dependent.

Let us consider some examples of constitutive dependence. Take *hot water*—the word *hot* is a determiner and *water* its determined. Since *hot water* belongs in the grammatical category of the noun (the category of the noun is taken in a wide sense of the noun proper and the noun phrase) and *water* belongs to the category of the noun as well then, in accordance with the Constitution Law, *water* is the constitutive component of *hot water*. Hence, in accordance with the Law of Dependence, *water* is head and *hot* its dependent.

As another example take the sentence *John woke*. The verb *woke* is the determiner and the noun *John* its determined. Since *John woke* belongs in the grammatical category of the sentence and the determined *John* belongs in the grammatical category of nouns then, in accordance with the Constitution Law, *woke* is the constitutive component and *John*, the complementary component of the sentence. Hence, in accordance with the Law of Dependence, *woke* is a head and *John* its dependent.

This reasoning is supported by empirical facts. Subjects cannot occur without predicates, but predicates can occur without subjects. Compare the declarative sentence *you walk* and the imperative *walk!*. Similarly in impersonal sentences only predicates occur. Clear examples of impersonal sentences are Latin *pluit* 'it rains / it is raining' or Russian *morozit* 'it freezes'.

Why can predicates function as sentence equivalents? In a complete sentence predicate contrasts with subject as part of the sentence. But in an impersonal sentence of Latin or Russian predicate represents the whole sentence. This dual function of predicate is strange compared with the normal function of predicates in impersonal sentences of English in sentences like *it rains* or *it freezes*. How can dual function of predicates be explained? This strange behavior of predicates is explained as one of innumerable consequences of the Superposition Law, discussed in the foregoing section. The Superposition Law explains the strange behavior of predicates as the normal process of superposition which happens in special contexts. Superposition in grammar produces syncretic grammatical categories. Predicates in impersonal constructions, having no dummy subjects like *it* in English, superpose with sentences, producing the syncretic grammatical category <predicate qua sentence>.

Let us now consider facts that seem to be counterexamples to the Constitution Law on the surface, but in reality are phenomena that support the principle. Take the sentence *the innocent are often deceived by the unscrupulous*—the phrases *the innocent* and *the unscrupulous* are clearly perceived as part of some reduced noun phrases like *the innocent people* or *the unscrupulous people*. But under the Constitution Law, *the innocent people* can be reduced to *the people* rather than to *the innocent* because both the noun phrase *the innocent people* and the noun *people* belong in the grammatical category of the noun. The same reasoning applies to *the innocent people*. The Constitution Law rules out the occurrence of adjectives without the co-occurrence of nouns and it rules out adjectives as constitutive components of noun phrases.

This contradiction is resolved as follows: In the sentence *the innocent are often deceived by the unscrupulous* the adjectives *innocent* and *unscrupulous* are not ordinary adjectives but adjectives superposed with nouns, <adjectives qua nouns>. Adjectives that belong in the syncretic grammatical category <adjective qua noun> function as nouns and therefore do not require co-occurrence of nouns like ordinary adjectives.

Now, let us take one-word sentences like *shame!* and *excellent*. We recognize that these sentences are outside the scope of the Constitution Law because this principle rules out one-word sentences if they do not comprise true predicates. The noun *shame* and the adjective *excellent* in these sentences are not true predicates that function as sentences. The sentences like *shame!* or *excellent* are explained by the Superposition Law as a direct superposition of word categories with the syntactic category of the sentence. These sentences do not belong in the grammatical category <predicate qua sentence> like subjectless impersonal sentences. Rather *shame!* belongs in the category <noun qua sentence>, and *excellent* in the category <adjective qua sentence>. The Superposition Law is not an *ad hoc* statement but a characterization of an essential phenomenon of language.

Let us now consider linguistic characterizations of sentences and word groups. Many linguists recognize correctly that a sentence has a binary structure: it consists of subject and predicate or subject group and predicate group. This binary structure of the sentence is called the predicative articulation of the sentence. The binary structure of the sentence contrasts with the binary structure of word groups like noun + adjective (*round table*), noun + prepositional attribute (*the leg of the table*), verb + adverb (*runs quickly*), and so on. The binary structure of word groups is called their attributive articulation.

The distinction between predicative and attributive articulation seems to be clear and this distinction does not seem to pose any problems. One cannot see any problem here if one does not distinguish between logical and linguistic concepts. The terms 'subject' and 'predicate' are used both in linguistics and logic. Are linguistic concepts of subject and predicate identical with the logical concepts of subject and predicate? No, they are not. The logical concepts of subject and predicate are tied to logical truth conditions which are alien to the true goals of linguistics. The linguistic concepts of subject and predicate must be defined in terms of proper linguistic notions. The confusion of linguistic concepts of subject and predicate with logical concepts of subject and predicate is no less shocking than the confusion of the linguistic concept of syntax with the logical concept of syntax.

Word-based syntactic theory offers an illuminating characterization of the concepts of subject and predicate and other syntactic concepts in terms of purely linguistic notions. Word-based syntactic theory captures the essential properties of attributive and predicative structures in terms of precise linguistic concepts.

What is the linguistic characterization of attributive and predicative structures? Let us consider the attributive structure as in *the blue sky* and the predicative structure as in *the sky is blue* with respect to the relation 'determiner-determined' between the components of these structures. Both *blue* and *is blue* are determiners whose meanings are supplemented by the meaning of *the sky*. However, under the Constitution Law, *the sky* is the constitutive component of *the blue sky*, but the complementary component of *the sky is blue*. In terms of the Law of Dependence we recognize that dependence between the binary components of the sentence and dependence between the binary components of the word group are mutually converse relation: in the sentence, determined (subject) depends on determiner (predicate), whereas in the word group, conversely, it is determiner (attribute) which depends on determined (any support of attribute, like noun with respect to adjective or verb with respect to adverb).

The above description provides a distinct linguistic characterization of the notions of subject, predicate, and syntactic relations as opposed to logical characterization of these notions.

This paper is an attempt towards making the sign the ruling concept governing linguists' analyses of language. The central sign of language is the word. I have attempted to show the rich and profound consequences of the concept of the word leading to a new typology of linguistic concepts and to a new conception of syntactic theory—to the ultimate reorientation of theoretical linguistics.

◆

COPULAR CONSTRUCTIONS, PARTICIPANT ROLES, AND THE LEXICON

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A NUMBER OF MORPHOSYNTACTIC PHENOMENA are more easily described if it is postulated that an element can instantiate more than one role in its occurrence—in other words, that different systems of roles can operate simultaneously, with a given element realizing units in each system. Such an approach, for example, underlies the by-now-standard practice of distinguishing between syntactic roles, such as subject and direct object, and 'participant' or 'semantic' or 'thematic' roles, such as AGENT or PATIENT (I will henceforth use the term 'participant role', or simply PR, for such roles[1], and use SMALL CAPITALS for PR labels). Among other things, the distinction between syntactic roles and PRs allows for an intuitively pleasing account of the relations between active and passive constructions:

(1) a. Bjorn ate the sandwich.
subject *direct object*
AGENT PATIENT
b. The sandwich was eaten by Bjorn.
subject *object of preposition*
PATIENT AGENT

The distinction allows the analyst to systematize the observation that, while *Bjorn* is the performer of the action in both (1)a and (1)b, the syntactic role of the NP *Bjorn* is different in the two sentences. The utility of PRs is such that some version of them is incorporated into many, if not most current linguistic theories, although in some cases they are considered part of (non-grammatical) semantics rather than part of morphosyntax, with the structural or semantic status of PRs being a major issue of metatheoretic dispute.

Any system of proposed roles, be they syntactic, semantic, or other, raises a set of questions. One concerns the composition of the roles themselves: exactly what are the proposed roles? Are they categorical primitives? Prototypes to which examples are matched based on a similarity criterion? An artifact of analysis? A second set of questions revolves around the issue of how the roles are assigned to elements. How, for example, do speakers go about deciding which NP is an AGENT and which NP is a PATIENT? The answers to the two types of questions can, of course, be interrelated, with particular conceptualizations of PR identity mandating particular conceptualizations of their assignment.

In the case of PRs, theorists within the past twenty years have varied enormously on what they consider the fundamental 'nature' of the roles to be, but many approaches have adopted what I will term a lexicalist answer to the question of role assignment. That is, they maintain that PR-specification is part of lexical entries, with lexical entries for verbs being analyzed most frequently. The attraction of the lexicalist position derives partly from the fact that verbs are the best predictors of PR-configuration in clauses—knowing that the head noun of the first direct-argument NP in a clause is *aardvark* does not help a speaker much in knowing whether the NP represents an AGENT or a PATIENT, but knowing that the verb of the clause is *eat*, rather than *sleep*, (or a form with different marking, such as is *eaten*) may.

Despite the intuitive appeal of such an approach, however, it begs a number of questions, which will be discussed below. In this paper, after reviewing relevant arguments about lexicalist vs. nonlexicalist positions, I will focus primarily on the difficulties that copular constructions pose for lexicalist accounts. Martin (1996), working within the Systemic-Functionalist Linguistics paradigm (henceforth SFL) has pointed out three problems with a verb-based approach to accounting for PRs in copular constructions; I will argue that the problems he raises are relevant to any theory which allows 'perspectival' PRs—a class of theories into which a number of other functionalist approaches will fall—and that the adoption of perspectival PRs in the analysis of copular constructions leads naturally to a clause-based, or more generally, taxemic approach to the treatment of such roles.

1. THE 'STANDARD MODERN LEXICALIST' POSITION. A number of current approaches to linguistic theory adopt some version of the following set of claims, which construct what I will call the 'standard modern lexicalist' position:

a. Information about morphemes and words is represented, in whole or in part, as separate 'lexical entries'.
b. Lexical entries exist as part of an independently describable lexicon
c. A set of PR-specifications (however constituted), or a semantic structure from which PRs can be directly computed, can comprise part of a lexical entry.
d. Some mechanism exists for creating correspondence relations between the items in the lexical entry's PR-specification set and particular morphosyntactic elements realized along with the realization of the lexical entry.

A fifth claim, which can be considered a modification to claim (d), is assumed by theories which make a distinction between 'internal' and 'external' arguments:

e. Subject NPs are assigned PRs by the predicate, rather than directly by the verb of the predicate, although the verb can indirectly provide the subject's PR (adapted from Chomsky 1981:37).

The most pertinent portion of this set for the discussion at hand is claims (c), (d), and (e), but it is important to recognize that the lexicalist position presupposes (a) and (b)—to say that PRs are 'lexically specified' is meaningless in a theory in which there are no lexical items, and to speak of lexical items is meaningful only if there are other, *nonlexical* items—and is vulnerable on those points as well. There is, of course, extensive variation among theories adopting this position, some of which I have tried to accommodate by making the claims as general as possible. For example, the phrase 'independently describable' in claim (b) is neutral in respect to whether a particular theory posits that the lexicon is or is not a formally separate 'module'. However, a theory which 'reifies' claims (a) and (b), i.e. a theory which claims that the lexicon is not only separately describable but separate in some physical way, is faced with the task of reconciling this stance with what is known of neurological and cognitive structure.

The form in which claim (c) is incorporated into particular theories also varies widely. The most basic approach is simply to list the PRs directly in the lexical entry, with the list itself being ordered or unordered depending upon the assignment mechanism proposed for (d); a good example is the 'theta grid' of generative models, such as Chomsky (1981). Alternatively, the verb's lexical entry can be conceptualized as a structured semantic description, with PRs being directly computable based on the description. Decompositional approaches, such as that of Jackendoff (1972, 1976) as well as approaches which directly relate verb meaning to PR-specification, such as Croft (1991), are examples of this latter type.

Claim (e) is problematic, in that under certain interpretations it could allow subject NPs to be assigned PRs which are not part of any lexical specification (and hence violate a strictly lexicalist approach). In practice, however, it is most often used in cases where the subject is assigned no PR, or in which the predicate is analyzed as an idiomatic chunk (as with *kick the bucket*). In certain cases, it may be useful to distinguish between *strict lexicalist* positions, which either do not include claim (e) or use it only for 'non-PR' subjects or subjects of idiomatic predicates, and *extended* lexicalist positions, which admit of non-lexical sources for PRs but claim that most PRs are assigned lexically. Both types mandate PR-specifications be part of at least some lexical entries.

Like any position in a scientific argument, the lexicalist approach developed in response to other arguments around it; it has a history, and that history is important to its interpretation. Traditional word-and-paradigm approaches to languages like Latin have long incorporated descriptive practices which are partly 'protolexicalist', in that they describe case patterns—which in these languages may be seen as exponents of PR configurations—as being directly associated with certain verbs. When one studies Latin, one learns that certain verbs 'take the dative' while others 'take the accusative'; the dative and the accusative cases are presented as both structural and semantic categories, with the two interpretations not being distinguished. Traditional accounts also, however, include descriptions which can be seen as nonlexicalist, such as the treatment of the dative/accusative alternation with verbs of motion in many Indo-European languages (the choice of dative to represent static location or accusative to represent the goal of movement is tied to verbs of motion in general, but not to specific verbs).

Most modern linguistic treatments of PRs derive in one way or another from three foundational works: Fillmore's (1966, 1968) analysis of 'deep cases', Gruber's (1965) analysis of 'thematic roles', and, within Systemic-Functional Linguistics, Halliday's (1967, 1968) presentation of 'participant roles'. None of these three approaches were specifically lexicalist. Fillmore considered clauses as realizing case frames which then formed part of the basis for verb selection; Gruber developed a localistic, generative-semantic account in which a 'prelexical' structure incorporating preposition-like elements served as the basis for lexical selection, while Halliday proposed a taxonomy of clause types, with each clause type realizing role and process sets. In all three cases, the connection between the choice of a specific verb and the PRs represented in the clause is resultant, rather than causative; the occurrence of the verb is an exponent of other factors. In Fillmore's approach, these other factors are the choices of PRs themselves, while in both Gruber's and Halliday's approaches, these other factors determine both PR and verb.

The lexicalist position in its recent forms developed in part as an attempt to reconcile modular theories which separate syntax from semantics with the observation that PRs are useful constructs with implications for both. Jackendoff (1972, 1976) argued for adopting Gruber's basic framework, but suggested some fundamental changes in the way it was implemented. Based on the general model developed in Chomsky (1965), Jackendoff started with a system in which semantics was an interpretive component separate from syntax, and in which both syntax and semantics could draw on comparatively rich lexical representations, containing subcategorization and selectional restriction specifications. Relocating Gruber's thematic roles to the lexicon yielded two strong advantages relative to Jackendoff's views on language. First, it solved the modularity problem they represented, since the lexicon could be viewed as a mediating element between the syntactic and semantic representations, and the lexicon, via its subcategorization restrictions, already had the basic structure necessary for specifying roles; all that was needed was an addition to the lexical entry which matched roles with subcategorized constituents.

Second, a lexical basis for PRs, I would argue, fit nicely with the 'decoding' perspective that an interpretive semantics encourages. If one considers the semantics generative, as Gruber did, models in which configurations of roles and other semantic elements select particular verbs work nicely; such models incorporate an encoding perspective in which the predictiveness advantage afforded by a lexicalist approach isn't relevant. In a decoding model, predictiveness is more relevant, and even though an 'interpretive' semantics of the type postulated by Chomsky and Jackendoff is ostensibly a correspondence model, rather than an encoding or decoding one, the labels used (like interpretive) still encourage a decoding perspective.

Jackendoff also expanded on Gruber's taxonomy of verb types and developed a decompositional account of verb meaning which allowed him to reflect the taxonomy directly, realizing categories of the taxonomy (such as states and state-changes) as operators with accompanying PRs, such as GO(theme). This approach has been directly adopted within Role and Reference Grammar (Foley & Van Valin 1984, Van Valin 1993); indirectly, it influenced Chomsky's conceptualization of 'theta roles' within the Government and Binding paradigm. Chomsky (1981) proposed a framework partially based on Jackendoff's in which the specification of PRs within the lexical entry was accomplished via a 'theta-grid', which was matched to arguments via a 'theta-criterion', which essentially acted as a biuniqueness condition assuring that each PR was assigned to exactly one argument and each argument received exactly one PR. The addition of PR-specifications to lexical entries then later enabled elimination of other kinds of subcategorization specifications, argued to be redundant; this, along with the adoption of claim (e), is the model reflected in what might be called 'mainstream' GB (see, for example, Radford 1988).

2. THE PROBLEM OF COPULAR CONSTRUCTIONS. The intuitive appeal of the lexicalist position derives largely from its utility in accounting for be the behavior of transitive, intransitive, and ditransitive verbs, ones whose meaning 'out of context' seems to involve the necessity of arguments with particular roles. The verb *eat*, for example, would naturally seem to involve something or someone that does the eating, as well as something which is eaten. Such an account will not, however, work very well for constructions formed with copular be in English, or for copular-like constructions in a number of other languages. Martin (1996:350–5) has pointed out three problems, paraphrased below, which such constructions pose for a verb-based lexicalist approach:

i. Some languages do not have verbs in constructions which are functionally equivalent to English copular constructions.
ii. Indexing PRs to the copula does not provide a rich enough basis for distinguishing functional subtypes of copular constructions.
iii. The verb-based approach necessitates, for some languages, treating predicate adjectives as verbs, although the morphological or syntactic behavior of such adjectives is frequently quite non-verbal.

There are a number of ways in which lexicalist positions could attempt to answer Martin's criticisms. I will present some of these below; however, there is a specific case with which I do not think a lexicalist approach can adequately deal, and the characteristics of this case have implications for how a class of theories approaches PRs. I should note at this point that Martin discusses a general class of what, in Systemic-Functional Linguistics, are termed *relational processes* (approximately the same as the traditional grammar category of *linking verbs*); I am restricting my arguments only to copular constructions.

Martin's first criticism, that a number of languages lack verbs in copular-like constructions, is subject to a version of the traditional linguistic 'presence of an absence' argument—that is, that such examples involve a *zero copula*. In principle, such a copula could have as full a lexical entry as any other verb, except that it would have no phonological specification. Whether or not such an argument is considered valid, of course depends in large part on the theory's stance toward zero elements in general; approaches with a strong bias towards empiricism typically place the burden of proof on the analyst claiming the zero element. However, in approaches which regularly utilize zero-element arguments (Government and Binding, for example), such an approach would be less problematic. In particular, linguists from a number of approaches would be comfortable with the idea of a zero copula in cases where the copula is 'missing' only under specific tense/aspect/modality conditions; e.g. Russian, in which present-tense copular constructions lack a copula but past or future tense constructions have an overt form. In a closed semiotic subsystem, the absence of other signs is itself a sign. The zero copula argument is most problematic in languages in which no copula-like constructions have overt copulas.

The difference between 'predicate nominal' constructions (NP COP NP) and 'predicate adjective' constructions (NP COP AdjP) on the one hand, and among certain subtypes within the category of predicate nominal constructions on the other, is related in some approaches, and it is thus worthwhile to deal with Martin's second and third criticisms together. Consider the following examples (cf. also Halliday 1967–8, 1993:122–38; Martin 1996:350–55)[2]:

(2) a. The man with the red hat is the president of Globeco.
b. The man with the red hat is Bjorn Garcia.
c. The man with the red hat is an employee of Globeco.
d. An employee of Globeco is an employee with low wages.
e. Bjorn Garcia is Hamlet.
f. Bjorn Garcia is Harold Sytherville.
g. Bjorn Garcia is rather tall.

There is a long tradition of distinguishing between sentences which establish an *identity* relationship between two referents (2a–b, e–f), and sentences which *characterize* one referent in terms of another referent-type (2c–d), or a quality (2)g. Systemic-Functional linguistics terms the first type *identificational* and the second *attributive*; Langacker (1991) uses the terms *referential* vs. *class-inclusive*, while Givón (1984:91) uses *referential* for the first type and *attributive* for cases of the second type in which the second element is an NP (he considers predicate adjective constructions separately). An immediate point of difference between the two types is that the first is 'reversible'—the two NPs can be reversed without altering the logical entailments of the sentence—whereas reversal of the second type changes the meaning or produces a highly marked result:

(2) a. The president of Globeco is the man with the red hat.
b. Bjorn Garcia is the man with the red hat.

but

(2) c'. %An employee of Globeco is the man with the red hat.
d'. %An employee with low wages is an employee of Globeco.
g'. %Rather tall is Bjorn Garcia

The approach within Systemic/functional Linguistics is to characterize the difference in terms of different participant roles:

(2) a. The man with the red hat is the president of Globeco.
IDENTIFIER IDENTIFIED
g. Bjorn Garcia is rather tall.
CARRIER ATTRIBUTE

Martin's argument is that if one assumes that the PRs involved are being assigned by the lexical item *be*, it is difficult to explain why one finds different roles in different examples; one verb should be associated with one PR-set. There are, however, several other extant explanations for this difference in types. One approach is to consider the difference due to the NPs involved. Identificational clauses usually involve 'dual-definite' cases in which the copula connects two definite NPs; in attributive constructions, on the other hand, the second element is usually either an indefinite NP or an adjective phrase. It is possible, then, to argue that the difference between identification and attribution is a function of the semantics of quantification and definiteness, rather than of PRs. Langacker (1991:67–68), for example, considers the construction-types different due to a difference in the cognitive representation of the 'landmark' constituted by the second element.

A second approach involves using claim (e), discussed above: one can argue that, in copular constructions, the subject is assigned a PR by the predicate as a whole, and that the difference between '*is the* X' and '*is an* X' is sufficient to establish different predicate types. Partee (1986) uses this strategy, together with the quantificational-logic strategy discussed earlier, to argue that attributive constructions involve such a 'fused' predicate. Dowty (1991) uses Partee's analysis to motivate a difference in PR-assignment in the two types (he considers identificational constructions, but not attributive ones, to involve two instances of the same PR). Schwartz (1993), operating within a different paradigm (Role and Reference Grammar), likewise argues that the second element in such constructions creates a 'fused' predicate by a process she terms 'argument incorporation'. Such approaches can account for the identificational vs. attributive distinction, but one could argue that they violate strict lexicalism.

Systemic-Functional Linguistics makes an additional distinction between types of copular constructions, however, one that has not received much attention within other approaches and which, I think, more strongly supports Martin's criticism of the verb-based lexicalist position. Halliday (1968) noted that when transitive verbs were used to paraphrase the copula in *contextualized* examples, the paraphrases exhibited voice distinctions. In a construction involving two proper nouns in which one refers to a well-known role in a play, the paraphrase relations may seem context-independent:

(2) e Bjorn is Hamlet ↔ Bjorn plays Hamlet.
e' Hamlet is Bjorn ↔ Hamlet is played by Bjorn

The same kind of relations, however, can be constructed for examples in which the relations are clearly context-dependent. Since both *Harold Sytherville* and *Bjorn Garcia* are indeterminate (for most people) between proper-name and name-of-dramatic-role interpretations out of context, multiple interpretations are possible.

Who is playing Harold Sytherville?
(2) f Bjorn Garcia is (plays) Harold Sytherville
f' Harold Sytherville is (is played by) Bjorn Garcia

If *Who is playing Bjorn Garcia?* is used as previous context, the voice-pattern in the paraphrase relations is reversed:

Who is playing Bjorn Garcia?
(2) f Bjorn Garcia is (is played by) Harold Sytherville
f' Harold Sytherville is (plays) Bjorn Garcia

Again, Systemic-Functional Linguistics represents this distinction in terms of PRs, TOKEN and VALUE; these form an intersecting set with the PRs IDENTIFIER and IDENTIFIED.

The difference between what I will call the *cryptoactive* type and the *cryptopassive* type is not expressible in terms of the definiteness of the NPs involved, and it is not subject to an alternative explanation on that basis—a more detailed treatment of the logical characteristics of dramatic role names versus regular proper nouns could potentially establish a distinction between the two similar to that used to account for the difference between definite and indefinite NPs, but we would still be left with the fact that examples such as 2f *are* reversible. Likewise, a 'composite predicate' explanation would be faced with the problem of accounting for how an argument incorporation process could take previous context into account.

There remain for discussion two viable counterarguments to Martin's criticisms. If we accept the claim that different subtypes of copular constructions have different PR-sets, we could still maintain that (a) there are multiple forms of the copula involved, each with its own PR-specification (the homonymy argument), or (b) it is possible for a lexical entry to enable more than one PR-specification, with the specifications serving as alternate possibilities (the alternation argument). Although the homonymy argument appears in the discussion of copular constructions fairly early—Halliday (1967.66), despite adopting a clausal basis for PRs, explicitly discussed three 'kinds' of *be*—it suffers from a problem which is also its advantage: it is too powerful. One can explain a plethora of phenomena via an appeal to homonymy, and such an appeal is almost impossible to disprove completely.

The alternation account, applied to copular constructions, would work differently than alternation accounts of other predicate types. With transitive and intransitive verbs, the term 'alternation' is primarily used to refer to cases in which a particular verb can occur with different numbers of arguments; e.g., *I walked* vs. *I walked the dog* (see Rosen, 1996, for a criticism of a verb-class-based implementation of this type of an alternation account). With copular constructions, the issue is not how many arguments there are, but what order the arguments occur in. In other words, the argument would hold that the semantic structure of be is the same in all identificational constructions, but that such constructions are always ambiguous as to *which* NP is, for example, the IDENTIFIER and which is the IDENTIFIED (with the ambiguity being attributable either to the way in which PR-specifications are computed from the copula's semantic structure or to the way in which the PR-to-argument matching algorithm operates). One could then assume that an interpreter generates all possible representations for the copular construction, and then picks the correct representation based on the context. This solution is workable, but, I would argue, more sophistic than sophisticated. The essence of the lexicalist position is the claim that PRs, and the orders in which they occur in constituents, are a function of lexical items, and to posit that one can have whatever order one wants, if needed, as a result of fortuitous overgeneration is to rescue the claim for no other reason than a desire not to abandon it. At the very least, an approach which accounts for the differences in role-sets without resorting to overgeneration would be preferable.

In summary, a number of Martin's criticisms of the lexicalist approach can be accommodated within a lexicalist position, but the distinction between cryptoactive and cryptopassive copular constructions cannot be so accommodated without, I would argue, simply creating apparatus to rescue the position. Not coincidentally, it is precisely with the cryptoactive/cryptopassive distinction that Systemic-Functional Linguistics provides the strongest argument for the relation of clause function to PRs.

2. A LARGER ISSUE. The discussion above primarily dealt with the question of whether Halliday's conception of cryptoactive and cryptopassive identificational constructions could be modeled within a lexicalist approach; the claim presented here is that it can be, but not satisfactorily—the means by which the distinction can be modeled constitute, to borrow computer slang, a 'kludge'. Focussing on modeling methods, however, overlooks a more fundamental point: the *kind* of PR involved in these constructions is one related directly to the function of identificational clauses as linguistic resources used in context. In other words, the PRs

identified and identifier are not related to the semantics of the verb *be* so much as they are related to the purposes for which speakers use these clauses.

It is possible, of course, to take this difference in the operation of identified and identifier as an indication that they are not PRs at all. Dowty (1991), for example, has explicitly eliminated 'perspectival' categories as PRs; he does not claim that they are irrelevant to linguistic theory, but that they are in a different class than roles like agent and patient. Underlying such a division is an assumption that there is a state of affairs independent of perspective, and that the linguistic categories that are involved in representing this state of affairs are by nature separate from the categories that are involved in a speaker's choice of alternative ways to represent that state. In a sense, the distinction between nonperspectival and perspectival categories reflects the familiar philosophical distinction between essence and accidence—two accidentally different representations can be created of what is essentially the same event, with the label 'PR' applicable only to what is essential.

There is a large class of theories, however, which either explicitly or implicitly treat perspectival and nonperspectival categories as equivalent. Langacker's Cognitive Grammar is a good example of a theory which incorporates speaker perspective explicitly, but closer examination of the terminology used in a number of other approaches reveals indirect adoption of perspectival categories. As a case in point, consider the fairly commonly used distinction between agent and instrument PRs. Given a relatively complex chain of causation, whether or not X causes an action or whether Y causes X to cause an action becomes a matter of viewpoint; strictly speaking every agent can be an instrument. Speakers obviously consider 'being an agent' and 'being an instrument' to be different (a fair amount of legal precedent, for example, is bound up in maintaining just such a distinction), and thus what status as an agent or an instrument entails to speakers is different, and languages use distinct sets of morphosyntactic marking patterns for the two, but those entailments, and the choice of pattern, result from construals of situations, and a single event can often be construed in a number of ways. Similarly, labels such as recipient and benefactive can be argued to encode perspective as well, since the semantic difference between roles so labeled and those labeled patient usually involves judgments of affectedness, and these judgments are perspectival.

In a theory which accepts perspectival roles, accepting identified and identifier as PRs suggests abandonment of a lexicalist position, as the nature of these roles is tied to the function of the clauses which instantiate them rather than to the meaning of be, out of context. Rather than 'locating' PRs within lexical items, they can instead be located within classes of clauses (or, more generally, taxemes, if one wants to apply PR-type analyses to the internal structure of units like noun phrases), with the association between lexical items and PRs being reinterpreted as a function of the degree to which a particular lexical item is associated with a particular clause type or taxeme[3].

Such a clause-based or taxemic approach allows one to account for the same phenomena as the lexicalist approach as well as enabling treatment of PRs like

IDENTIFIED. The 'predictiveness' of verbs, which makes the lexicalist approach attractive for decoding models, is simply a correlation between verbs and PR-frames, and like any correlation, it is subject to multiple causal interpretations. If a particular verb is associated only with a clause type instantiating AGENT and PATIENT PRs, then a speaker interpreting a clause with that verb can likewise infer the proper PRs. In addition, however, the same speaker could essay an interpretation of the same verb if, for the first time, it was used with a clause type which does not instantiate a PATIENT role. Thus, a speaker could both expect a PATIENT argument in a sentence like *I faxed the documents*, and understand a 'deviant' sentence like *I faxed for three hours this afternoon*. Speaker intuitions about the number and kind of arguments implied by a verb 'out of context' can be attributed in part to associations between the verb and the clause-type(s) in which it is most often used; after all, no lexical item, especially a verb, is ever used out of context to begin with, and it is in context that we learn how to use it.

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[1] The choice of 'participant role' is based partially on neutrality relative to the syntax/semantics distinction, and partially on transparency—the label reflects at least to some extent what it is intended to represent. 'Thematic role', although appropriate to Gruber's analysis (he focused primarily on a role he labeled THEME) is not only opaque when applied to sets of roles that have nothing to do with Gruber's THEME, but potentially confusing in arguments in which terms such as *theme*, in opposition to *rheme*, are being used.

[2] There is disagreement over whether the two arguments of an NP BE NP construction bear the same role or not; most analysts use different role labels for the two NPs, but Dowty (1991) has argued for a 'symmetrical' analysis with identical role assignments. I will be adopting a non-symmetrical analysis for purposes of this discussion, for reasons outside the scope of the paper.

[3] One can, of course, adopt a taxemic approach without adopting perspectival PRs, and for reasons other than the treatment of PRs in general. There are a number of other reasons within SFL for adopting such an approach, and other theories, such as Construction Grammar (cf. Goldberg 1995; Kay and Fillmore 1999) do so as well.

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SEMANTIC AND GRAMMATICAL SUPERPOSITION IN ENGLISH

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Briefly, functional superposition[1] is a theory that claims that, under certain circumstances, a linguistic expression can have a secondary function[2] overlaid onto a primary function, resulting in a new, bistratal function[3] (Shaumyan 1987:116, Sypniewski 1996:279)[4]. Since Applicative Universal Grammar (AUG) is a semiotic theory, a proper analysis of meaning must respect semiotic distinctions and considerations (Shaumyan and Sypniewski 1995:547). Functional superposition is a theory about the functions of grammatical aspects of language. As it has developed to date, superposition stands for 'grammatical superposition'. Grammatical superposition is a theory about the *structure* of language. In this paper, I will present some preliminary work applying the theory of superposition to semantic aspects of language. Since structure and semantics are intimately related, any change to the structure of an expression may also produce a semantic change in the expression. I propose that the theory of superposition can explain how speakers can produce and listeners can understand expressions with several simultaneous layers of semantic meaning[5].

1. superposibility and nonsuperposibility. Because I am trying to produce a computer model of superposition, I have developed a working theory of linguistic context. At its present stage of development, the theory of linguistic context is based upon the opposition *nonsuperposible::superposible*. There are no inherently superposible linguistic expressions; i.e., there are no expressions that, by their very nature, are superposed. Superposition takes place within a linguistic context. Superposition results from applying a superposer[6] to some linguistic expression. One superposer is the linear relation of words that form an expression. Another superposer in some languages[7] is the use of an affix. Theoretically, every linguistic expression may be superposed. However, some words and linguistic expressions are more likely to be superposed than other words or expressions. Some words, such as prepositions and articles, are so unlikely to be superposed that we are justified in referring to them as *nonsuperposible* from context to context. Therefore, we create the opposition *nonsuperposible::superposible*.

Nonsuperposible words and expressions form templates for sentences. Figure 1 (overleaf) shows a template with the nonsuperposible words highlighted[8]. The *superposible* linguistic expressions describe contexts in which superposition can occur. As we will see later, contexts can be limited to linguistic expressions or can range over the sentence as a whole.

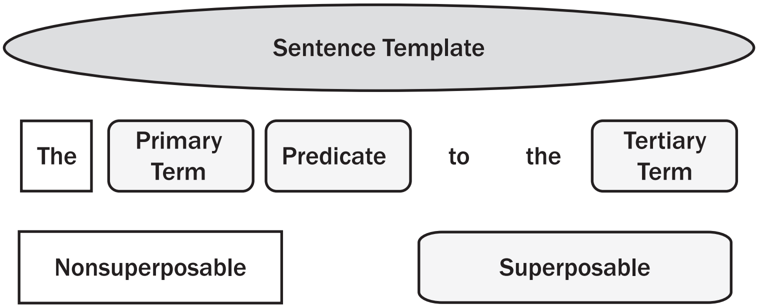

Figure 1.

AUG claims that linguistic expressions have an *aggregate* type. For example, a term[9] may consist of one or more words[10] but the entire group has the type term. *Car* is a term. The entire phrase *big yellow car* is also a term. Certainly, the phrase *big yellow car* may be analyzed to see that a term *car* is modified by two term modifiers (type **Ott**), *big* and *yellow*. However, AUG does not have a theory of static types. The term modifiers are applied; the **O** in their types indicate that they are operators, i.e., linguistic functions. Saying that *yellow* has the type **Ott** in the expression big yellow car means that when *yellow* is applied to *car*, it produces a new term: **yellow car**. The term modifier *big* does not modify *car*. It modifies *yellow car* and produces a new term *big yellow car*. In order to understand how the theory of superposition extends to semantic relations, the notion of an aggregate type must be kept in mind. In Figure 1, primary term and tertiary term may be one word or may be arbitrarily complex expressions. Regardless of their internal complexity, they act and react as units, with single, simple types (type **t**). Superposition may occur to an individual word, an individual word or phrase that is part of the complex expression or to the entire expression.

Nonsuperposible words create ‘open ended’ expressions. Nonsuperposible words usually initiate an expression but do not end an expression with anywhere near the same frequency. A linguistic expression does not need to begin with or contain any nonsuperposible words. Nonsuperposible words alone cannot form complete linguistic expressions. Therefore, a *linguistic expression* is defined as an instance of the *nonsuperposible::superposible* opposition in which the nonsuperposible element may or may not be empty.

2. SEMANTIC SUPERPOSITION IN ENGLISH. Shaumyan and Sypniewski (1995) discusses lexical meanings such as *agent* and *patient*. I will not discuss strictly lexical meanings here, although the preliminary work for this paper started with an examination of those meanings. Very early in my work, it became apparent that the superposition process involved semantic meanings. When an expression is functionally superposed, the meaning of the expression may also change. A

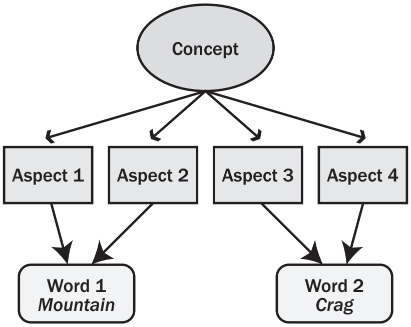

Figure 2. *Mountain crag.*

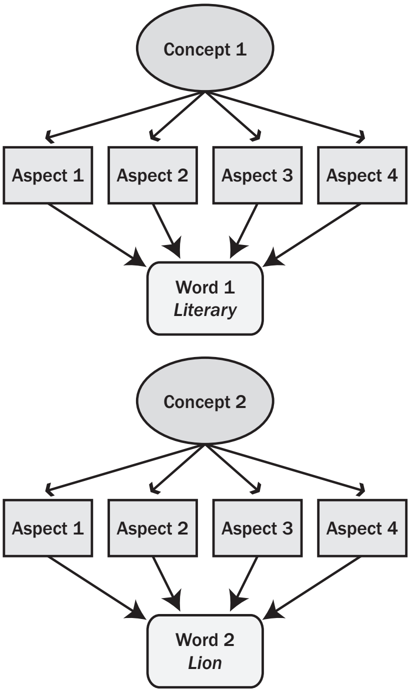

Figure 3. *Literary lion.*

semantic relation between words depends on the relation between their underlying concepts[11]. Words relate semantically in either of two broad ways[12]. Any concept is composed of one or more aspects, i.e., important portions[13], of its central idea. In the first relation, Figure 2, two words (*mountain* and *crag*) relate to each other as words that describe different elements of the same concept. Figure 2 demonstrates that a linguistic expression that consists of related concepts contains a meaning that is reinforced rather than superposed.In the second relation, Figure 3, two words (*literary* and *lion*) are members of the same linguistic expression but relate to each other as words that describe aspects of two different concepts. If we see concepts as a relational network as described in Lamb (1999), Figure 3 describes an intersection between two different relational networks. For the purposes of this paper, it is not important how far each relational network extends into representations of the tactile, auditory, visual, or other realms. Figure 3 describes two relational networks that share their information in such a way as to create a new linguistic expression that includes elements of each network. Neither network overwhelms the other. This is why the new linguistic expression is bistratal. If one network dominated the other, the relation between them would not be a superposition relation.

Obviously, *literary lion* is a metaphor for *author*. The context in Figure 3 is more likely to be a semantic superposer than the context in Figure 2. In the expression *literary lion*, the use of two lexically diverse words superposes the notion of *lion* on *author*[14]. I claim that semantic superposition explains the notion of metaphor. Similes are not necessarily examples of semantic superposition. For example, a simile with a meaning like *literary lion* might be *the author was like a lion*. The simile presents two separate concepts to the reader or listener. The metaphor, *literary lion*,

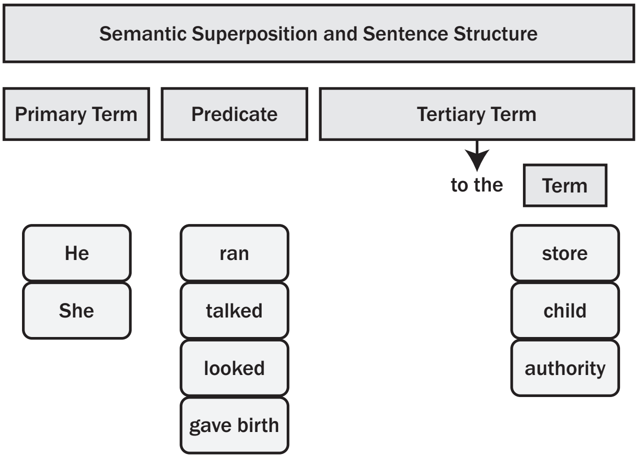

Figure 4. Different word combinations may or may not superpose a linguistic expression.

presents one, bistratal concept. Furthermore, the simile does not create a single linguistic expression. The metaphor does. Semantic superposition requires both a single expression and a bistratal concept. We may define semantic superposition by reworking the formal definition of functional superposition (footnote 2):

> *Let* **E** *be an expression with semantic meaning* **x***, and let* **E** *take on semantic meaning* **y** *over semantic meaning* **x***. Then* **E** *shall be said to have to a semantic meaning* **z** *such that* **z** *is stratified into* **y** *superposed onto* **x***. Semantic meaning* **z** *is represented by the formula:* **S<y:x>***, where colon (:) indicates the stratification of semantic meaning* **z** *into* **y** *superposed on* **x***, enclosed in angle brackets. The letter* **S** *indicates that we describe a semantic relation rather than a functional relation. The right part of the formula indicates the primary semantic meaning of* **E***, and its left part indicates the secondary semantic meaning of* **E***.*

We may describe *literary lion* as **S<lion:author>**[15].

Figure 4 provides a template and a small set of words. By inserting various word combinations into the template, we can see that function, considered alone, may play a small role in semantic superposition. Some word combinations (*He/She ran to the store*) are completely unremarkable. On the other hand, some combinations (*He gave birth to the store*) may suggest metaphors, albeit clumsy ones, even though similar word combinations (*She gave birth to the child*) definitely do not. Some word combinations may create a dissonance (*He gave birth to the child*) although the replacement of one word (*She gave birth to the child*) results in a perfectly ordinary and acceptable sentence.

None of these observations is particularly startling or innovative. I wish to focus on the role of the *nonsuperposible::superposible* opposition and semantic superposition rather than the obvious semantic relations in these sentences. Any semantic superposition that takes place in these sentences takes place solely because of context. The sentence template holds steady throughout the substitution of word combinations. The sentence template is created by the nonsuperposible::superposible opposition between the 'slots' in the sentence template. In other words, the mere presence of nonsuperposible words creates both linguistic expressions and linguistic contexts. The individual nonsuperposible word does not create the template or context. In the tertiary term in Figure 4, substituting the word *from* for the word *to* does not change the structure of the template. One nonsuperposible word replaces another. The substitution, however, changes the semantic relations between some word combinations. A number of sentences resulting from combinations of the suggested words and the substitution of the word from are unacceptable. Contexts must be seen from *both* the grammatical and semantic points of view when determining whether some form of superposition has occurred.

The word combinations in Figure 4 demonstrate that one linguistic expression may superpose another linguistic expression while being superposed itself. I call this *reciprocal superposition*. For example, consider the sentence:

(1) He gave birth to the store

The sentence is metaphorical. Human beings do not give birth to non-human entities. Furthermore, male human beings do not biologically give birth at all. The primary term *He* and the tertiary term *the store* semantically superpose the predicate *gave birth to*. The predicate takes on the meaning of originate or founded: **S<biological birth:origin>** We can also say that the predicate and the tertiary term superpose the primary term: **S<mother:founder>**. The complete analysis of a metaphor involves several layers of superposition that take place simultaneously[16].

Semantic superposition may only effect semantic relations and not grammatical ones. There is an interesting relationship between functional and semantic superposition. Nonsuperposibility and superposibility for expressions considered grammatically and semantically often, but not always, track each other. Figure 5 is a chart of the superposibility and nonsuperposibility of words[17] in the first sentence of Edgar Allen Poe's *Descent into the Maelstrom*. I set the 'value' of nonsuperposibility at 10 and the 'value' of superposibility at 1 so that they could easily be seen. I charted the grammatical relation in series 1 and the semantic relation in series 2. With the exception of the first two words, the series overlapped, showing that the potential for functional superposition and semantic superposition were similar over the sentence. I have only just begun to chart sentences in this fashion. Much theoretical and operational work in this area needs to be done. However, preliminary work suggests that many, if not most, sentences will show significant overlaps between the chart of the grammatical and semantic series. Figure 5 does not suggest that a grammatically

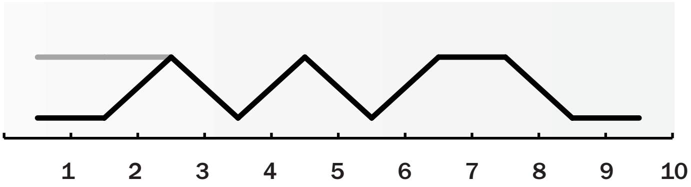

Figure 5.

superposed expression *necessarily* will be semantically superposed as well. The linguistic relations graphed in Figure 5 are not universal but may be typical. One area for fruitful research is simultaneous grammatical and semantic superposition. Another area needing attention is the exact nature of the linguistic expression in a *nonsuperposible :: superposible* relation. Must we consider word forms to be superposible or nonsuperposible or must we consider all forms of a word together as superposible or nonsuperposible? This question arises most strongly with pronouns. For example, when the first person singular pronoun changes to a singular possessive, a plural or a plural possessive, it radically changes form. Certainly, there is a semantic difference between the first person singular and plural. Furthermore, the first person plural can be used as a singular (the editorial or royal *we*), suggesting that at least *we* may be superposible. On the other hand, each form of the first person remains invariant in meaning and morphology, suggesting that the individual form may be nonsuperposible. These issues will not be resolved here.

Poe's *Descent into the Maelstrom* contains 7067 words. There are 1665 unique words: 248 nonsuperposible words and 1417 superposible words. Nonsuperposible words account for 18% of the unique words in the text. However, of all the 7067 words in the text, 4233 words are nonsuperposible and only 2831 are superposible. Nonsuperposible words account for 60% of the words used in the text. At least in this text, a small number of unique words is heavily used to create grammatical structure. The words *of* and the occur *820* times. These two words account for 19% of the instances of nonsuperposible words and 12% of the instances of all words. The *nonsuperposible::superposible* opposition is real, important, and measurable. These data may be effected by the resolution of questions like the pronoun question referred to above. However, I do not expect to see a significant change in the relation between number of instances of nonsuperposible words and their structural importance to a text.

3. CONCLUSIONS. Sentences are not random collections of superposibility and nonsuperposibility. The opposition *nonsuperposible::superposible* creates the structure of a sentence. In a sense, types are subordinate to this opposition. Types 'fill out' the structure created by superposible and nonsuperposible expressions, i.e., the nonsuperposible::superposible opposition may be a more general notion than the

notion of linguistic types. The juxtaposition of types and the *nonsuperposible::superposible* opposition is worthy of additional study.

Semantic superposition and the theory of superposition in general may prove useful to theories other than Applicative Universal Grammar. Relational network theory may be able to adopt superposition to explain the relation between different relational networks.

Semantic superposition can adequately explain such literary conventions as the metaphor. Additional research may reveal the role that semantic superposition plays in other literary conventions. Semantic superposition may not factor into the creation or use of some conventions, e.g., the simile. The fact that the theory of superposition can be extended to semantics and that it can be used to describe literary conventions such as the metaphor amply demonstrate that superposition is a valid linguistic theory that must be examined by theorists who are grounded in schools of linguistics other than AUG.

I have not examined languages other than English to determine whether the relations seen in the superposition of English expressions equally apply to other languages. For example, it is not clear how or whether the *nonsuperposible::superposible* opposition might have to be modified for Chinese or Latin. Nonsuperposible words may play little role in a language such as Latin but a much larger role in languages such as Chinese.

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[1] This paper assumes that the reader has some familiarity with Applicative Universal Grammar (AUG). A reader may gain more familiarity with AUG by downloading my *Outline of Applicative Universal Grammar* from my web site The *Outline* is an Adobe Acrobat file that may be freely downloaded and distributed. The URL is:

http://elvis.rowan.edu/~bps/ling/ling.htm.

[2] An expression may have more than one additional function superposed upon it. Such functions are referred to as tertiary, quartenary, etc. functions. For simplicity's sake, this paper will only consider secondary functions.

[3] The formal definition of superposition is:

> Let **E** be an expression of type **x**, and let **E** take on type **y** over type **x**. Then **E** shall be said to belong to a type **z** such that **z** is stratified into **y** superposed onto **x**. Type **z** is represented by the formula: **<y : x>**, where colon (:) indicates the stratification of type **z** into **y** superposed on **x**, enclosed in angle brackets. The right part of the formula indicates the primary type of **E**, and its left part indicates the secondary type of **E**. (Shaumyan & Segond 1993:8)

[4] Rather than review the theory of superposition here, the reader is referred to Shaumyan (1987) and Sypniewski (1996).

[5] I intentionally use the phrase semantic meaning. Shaumyan and Sypniewski (1995) treat grammatical functions as types of meaning. I wish to distinguish between grammatical and semantic meanings in this paper although, strictly speaking, the grammatical and semantic meanings of an expression exist simultaneously.

[6] A superposer is some linguistic device that, when applied to a linguistic expression **E**, superposes **E**. A superposer may be an affix, context, stress, or any similar device or

devices. Superposes may be applied singularly, e.g., the possessive suffix *-'s*, or several superposers may be applied simultaneously, e.g., adding the suffix *-ing* to *run* and placing the resulting expression in a modification context with a term: *running shoe*.

[7] Superposition occurs on the genotype level of language. The genotype level of language is AUG's universal level of language. The genotype level consists of a series of abstractions that all languages share. AUG posits another level of language: the phenotype level. This is the level of individual languages. According to AUG, every language consists of expressions of genotype abstractions. Every language is free to express genotype abstractions in ways that may be different from other languages. For example, English directly expresses the notion of predication, even if only by some variant of the verb *be*. Chinese expresses the notion of predication but often omits the direct use of a verb. A simple example is the greeting *Ni hao ma?* 'How are you?'.

[8] Normally, these words would be considered part of their respective terms but it is instructive to see that they create contexts for superposible words.

[9] In AUG, term refers to an expression upon which a predicate acts in order to form a sentence. Most commonly, terms are referred to as subjects, direct objects, and indirect objects. A term can be one or more words. Terms are not limited to nouns. A term is a single unit not matter how complex internally. In AUG, a term is treated as a single unit with a single type **t**.

[10] In some theories, these are referred to as 'complete subjects', etc.

[11] I will not define or describe the notion of concept any further in this paper.

[12] There are, of course, many possible variations.

[13] I envision concept very abstractly so that a concept may have the aspect of size rather than an aspect of little or big. We may think of aspects of concepts as attribute-value pairs. If size is an aspect, it may have values such as big and little.

[14] I will not discuss reciprocal superposition in which the notion of *lion* is superposed on the notion of *author*. A more complete discussion than can be presented here will have to consider reciprocal superposition.

[15] The notation is based on functional superposition notation and may need to be revised in order to properly express a reciprocal relation between concepts.

[16] This raises the interesting question of whether the entire sentence is superposed.

[17] It is actually a chart of the superposibility and nonsuperposibility of word forms in the sentence indicated.

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WORD-TYPE EFFECTS IN THE LEXICAL PROCESSING OF DIFFERENT-SCRIPT BILINGUALS

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The architecture of the bilingual lexicon has traditionally occupied a central place in the study of bilingual cognitive organization and processing. Whereas researchers working in the area of the monolingual lexicon studied the role of semantic, phonological, orthographic, morphological and other variables in lexical organization, bilingual literature has until recently viewed language barrier as the major determiner of bilingual word organization, debating the issue of whether words of the two languages are stored on a common or separate basis. The common/separate dichotomy has recently started to give way to the view of the bilingual lexicon as a non-uniform structure that varies across, as well as within individuals. According to this view, bilingual lexical representations may be shared to different degrees, depending on a variety of factors. To account for the within-individual variation in bilingual word processing, researchers have turned to the study of word characteristics and various combinations of representational elements that cause interlingual facilitation or inhibition. Such an approach has also brought the domains of bilingual and monolingual lexicons one step closer to sharing a common view of these phenomena.

1. background: the structure of bilingual lexicon. The common/separate dichotomy goes back to Weinreich's (1953) early distinction between compound and coordinate bilinguals. Evidence has been produced in favor of both common and separate storage. Little interlingual facilitation was obtained on word fragment completion (Watkins & Peynircioglu 1983) and repetition priming tasks (Scarborough et al. 1984), supporting autonomous lexical stores. A number of other tasks, such as semantic priming (Schwanenflugel & Rey 1986) and Stroop technique (Preston & Lambert 1969), have produced evidence in favor of a common language-independent store. However, it is possible that the different task types in fact probe two different levels of representation, which may have led to conflicting results. Kroll (1993) proposed a distinction between a general conceptual, language-independent level of representation in which the semantic features of words are stored, and a more language-specific lexical level where actual words are stored. The nature of connections between these two levels of representation now became the focus of debate. The first proposal, Concept-Mediation, postulated that L1 and L2 words are connected via a language-independent conceptual module (Potter et al. 1984). The alternative model, Word-Association, allowed for interlingual links

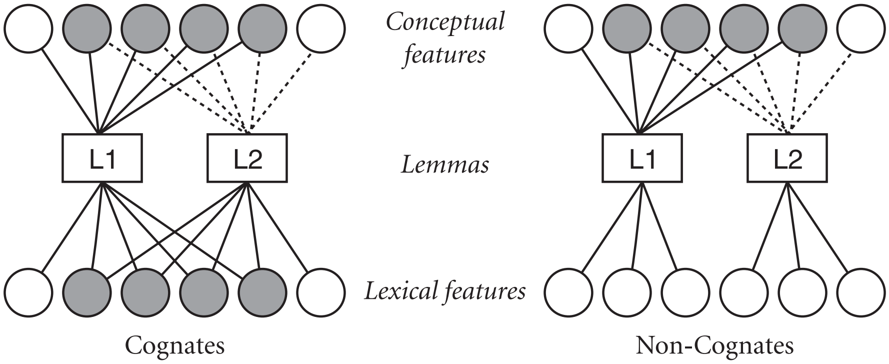

Figure 1. Kroll & De Groot's (1997) lexical/conceptual feature model (adapted)

between equivalent words, while the conceptual store could only be directly accessed from L1. Evidence for the latter model was based primarily on less proficient bilinguals (Chen & Leung 1989), suggesting a developmental shift from word-association to concept-mediation. More recently, it has been proposed that lexical representation is non-uniform not only across but also *within* bilinguals.

2. MIXED REPRESENTATIONS AND WORD-TYPE EFFECTS IN BILINGUALS. De Groot (1993) put forward a mixed-representational system, where the representation of a pair of interlingual equivalents depends on the particular characteristics of these lexical items and their associated concepts. She suggested that various interlingual pairs differ in the extent to which they share conceptual elements, where each element is represented as a node, and each word—as a collection of nodes, similar to some suggestions in the monolingual literature. This account was later extended into Kroll and de Groot's (1997) distributed lexical/conceptual feature model that differentiates between representational elements at the conceptual and lexical levels (see Figure 1). As is commonly the case in bilingual research, the lexical level does not include aspects of word meaning but only aspects of form. The language-specific lemma mediates between the above two levels and higher-level language processes and, in the absence of sentential context, largely reflects the mapping between the lexical and conceptual levels. Various classes of words differ in terms of their form/meaning mapping, i.e., in the extent to which they share representational elements at the two levels. This approach allows an examination of the bilingual lexicon from a more universal perspective, instead of viewing language barrier as its major determiner.

Uncovering the combinations of elements at the two levels of representation that contribute to the greatest degree of interlingual facilitation (and inhibition) in different-script bilinguals is the major focus of the present study. This is achieved by examining how such bilinguals process different types of word pairs representing various form/meaning mapping combinations, summarized in Table 1.

	L 1 (RUSSIAN)	L 2 (ENGLISH)	Form	Meaning	Abbreviation
1.	Translation Equivalent *ошибка* (oshibka) –‘mistake’	Translation Equivalent *mistake*	-	+	TrEq
2.	Cognate *секрет* (sekret) – ‘secret’	Cognate *secret*	+	+	Cogn
3,	False Friend *батон* (baton) – ‘loaf’	False Friend *baton*	+	-(?)	FfFf
4.		Translation Equivalent *loaf*	-	+	FfTr
5.	Phonologically Similar *сок* (sok) – ‘juice’	Phonologically Similar *sock*	+(?)	-	PhSim
6.	Any word *ветер* (veter) – ‘wind’	Non-translation *snake*	-	-	Unrel
7,	Ambiguous1 (X1, x2) *язык* (jazyk) ‘tongue/language’ – primed by *рот* (rot) ‘mouth’	Translation of (X1) *TONGUE*	-	+	A1Yes
8		Translation of (x2) *language*	-	+(?)	A1No
9,	Ambiguous 2a (Y1, y2) *роман* (roman)‘romance/ novel’ - primed by *любовь* (liubov’) ‘love’	Cognate (Y1) *ROMANCE*	+	+	A2CYes
10		Translation of (y2) *novel*	-	+(?)	A2NcNo
11	Ambiguous 2b (y1, Y2) *акция* (aktsija) ‘action/share’ – primed by *корпоратция* (korporatsija) ‘corporation’	Cognate (y1) *action*	+	+(?)	A2CNo
12		Translation of (Y2) *SHARE*	-	+	A2NcYes

Table 1. Main interlingual stimulus types (where ‘+’ stands for ‘similar’, ‘-‘ stands for ‘different’, ‘?’ indicates unclear cases; the contextually primed meanings of homophones are capitalized).

Whereas the processing of translation equivalents, cognates and, to a certain extent, false friends by same-script bilinguals has received due attention, very few studies have used bilinguals whose languages employ different alphabets (e.g., Gollan et al. 1997). Examining how various word types are processed by different-script bilinguals and comparing the results to those obtained for same-script bilinguals, makes it possible to focus on the role played by orthographic overlap in bilingual lexical processing. Whereas for same-script bilinguals, interlingual form similarity involves shared phonological and orthographic features, for different-script bilinguals it can only be phonologically-based[1]. Some of the above word types, such as false friends, have not been examined at all for different-script bilinguals, and some others have not been the subject of any bilingual research. The latter is especially true of ambiguous words (intralingual homophones), i.e., items that have two different L2 translations, one for each of the meanings. At the same time, ambiguous word processing has occupied a prominent position in monolingual psycholinguistic literature. Early research focused primarily on whether lexical ambiguity inhibits processing, and later studies examined the issue of multiple meaning activation in ambiguous items. These issues, among others, are addressed in the present study from the bilingual perspective, in the context of determining combinations of elements conducive to interlingual activation.

This study was designed to address the following questions, among others, through the comparisons involving the word pairs summarized above (the test and control lexical type are listed after each question):

1. Does overlap at the lexical feature level give cognates a processing advantage compared to non-cognate translations? *Cognates ↔ Translation equivalents*
2. Does lexical feature overlap result in the same degree of interlingual activation (IA) as conceptual overlap? (i.e., are a word's false friend and its true translation activated with equal ease?) *False friends ↔ False friend in L1 and its real L2 translation*
3. Is IA based on conceptual feature overlap inhibited when there is a competing candidate based on lexical feature overlap? (i.e., is IA between a word and its translation equivalent increased when the word does not have any 'false friends'?) *Translation equivalents ↔ False friend in L1 and its real L2 translation*
4. Can lexical feature overlap alone result in IA? *False friends ↔ Non-translations*
5. Is multiple meaning activation carried over across languages? (i.e., does an ambiguous word activate all of its translations?)
   Ambiguous L1 words and contextually unprimed L2 translations ↔ Non-translations/ Ambiguous L1 words and contextually primed L2 translations
6. Is there an ambiguity disadvantage effect?
   Ambiguous L1 word and contextually primed L2 translation ↔ Translation Equivalents
   Ambiguous L1 word and contextually primed L2 cognate translation ↔ Cognates

These issues were investigated in two on-line experiments involving Russian-English bilinguals: the cross-linguistic primed lexical decision task and the translation recognition task.

3. EXPERIMENT 1: CROSS-LINGUISTIC PRIMING.

3.1. PARTICIPANTS. 38 advanced Russian-English bilinguals participated in the experiment. All of them were educated adults currently living in Edmonton, Canada. All the bilinguals were Russian-dominant, had lived in Canada for the average of 5 years and received 7 years of classroom instruction. The average starting age for learning English was 12. Their proficiency was assessed based on self-rating (all had rated themselves in excess of 5 on a 7-point scale) and on a proficiency test built into the experimental set.

3.2. STIMULI. The main interlingual stimulus types used in the study were summarized in Table 1 above. In order to bias the participants' reading of an L1 homophone, an L1 preprime was presented before each stimulus pair. For example, a participant saw the sequence [*стрела* (strela) 'arrow' — *лук* (luwk) 'onion/bow' — *bow*], in which case the English translation and the Russian

		Mean RT (ms)		
	Stimulus Type	Unprimed	Primed	Priming Effect
1.	Translation Equivalents	819.3	736.0	83.3
2.	Cognates	778.0	679.8	98.2
3.	False Friends	838.5	769.6	68.9
4.	False Friends with Real Translations	832.4	791.6	40.8
5.	Phonologically Similar Words	813.3	828.6	-15.3
6.	Unrelated Words	822.6	824.0	-1.4
7.	Ambiguous 1 (X1, x2) with Translation of X1	837.0	730.0	107.0
8.	Ambiguous 1 (X1, x2) with Translation of x2	788.7	739.1	49.6
9.	Ambiguous 2 (Y1, y2) with Cognate Y1	852.2	757.1	95.1
10.	Ambiguous 2 (Y1, y2) with Translation of y2	882.5	788.6	93.9
11.	Ambiguous 2 (y1, Y2) with Cognate y1	829.0	702.5	126.5
12.	Ambiguous 2 (y1, Y2) with Translation of Y2	888.6	809.1	79.5

Table 2. Mean reaction time (RT) as a function of stimululs type and priming condition.

preprime refer to the same meaning of the ambiguous Russian word. In order to bias the reading of the ambiguous word toward a different meaning, the Russian preprime would have to be replaced, for example, by *овощ* (ovosch) ‘vegetable’. In addition to the stimulus pairs in Table 1, there were also pairs consisting of real English targets primed by Russian nonsense words (used as a baseline measure to calculate the priming effect), as well as pairs of English nonsense words primed by Russian real or nonsense words (to balance the number of ‘yes’ and ‘no’ responses).

3.3. PROCEDURE. The PsyScope software package (Cohen et al. 1993) was used for stimulus presentation and data recording. Each trial consisted of three items: a Russian preprime, a Russian prime and an English target presented consecutively on the computer screen, one under another. The participants were instructed to decide whether the target was a real English word by pushing the ‘yes’ or ‘no’ button as fast and as accurately as possible. The L1 preprime was presented for 300 ms; after an ISI of 400 ms, the L1 prime was presented for 350 ms, followed by another ISI of 250 ms; finally, the L2 target was presented and stayed on the screen until a decision was reached by the participant. The task consisted of 312 trials and took an average of 20 minutes to complete.

3.4. RESULTS. The data were analyzed using a 2-by-12 repeated measures ANOVA, with presentation condition (primed vs. unprimed) and stimulus type as within-subjects variables. The mean values for each stimulus type are presented in Table 2, along with the priming effect (the latter was calculated by subtracting the RT in the primed condition from that in the unprimed condition).

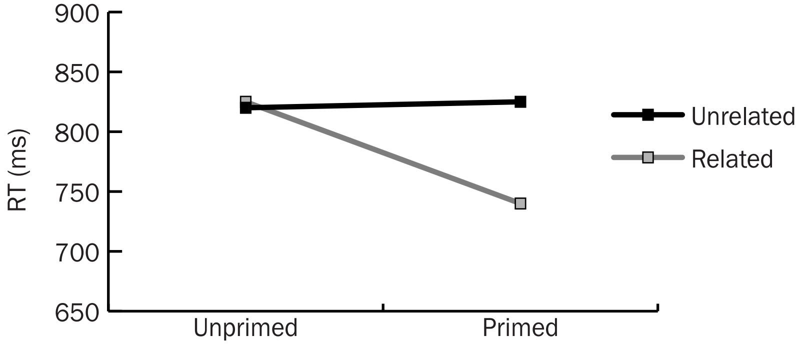

Figure 2. Overall priming effect.

A substantial overall interlingual priming effect was obtained, F_1 (1, 32) = 56.8, $p<0.01$ and F_2 (1, 100) = 94.3, $p<0.01$, where F_1 refers to the subjects analysis and F_2 refers to the items analysis. This interlingual facilitation suggests that words of the two languages are not separated in the mind of a bilingual, even when the languages use different orthographies. The effect is illustrated in Figure 2. The main effect of stimulus type was also significant, F_1 (11, 352) = 7.5, $p<0.01$ and F_2 (11, 100) = 2.0, $p<0.05$, suggesting that different feature combinations at the conceptual and lexical level result in varying degrees of processing difficulty. The key data patterns obtained so far show that shared elements at either level result in interlingual activation, which can be seen from the priming effect for pairs that are related through meaning (e.g., translations) or form (e.g., false friends). The presence of lexical as well as conceptual overlap provides an additional facilitation, as evident from the processing advantage of cognates over non-cognate translations and false friends. The results obtained for ambiguous words indicate that such items activate both of their translations irrespective of the context: pairs involving unprimed translations of these items were processed faster than unrelated words. Cognate and false friend data from this experiment show that different orthographies used in Russian and English do not prevent interlingual activation based on shared lexical features from taking place, suggesting that script is not a basis for language separation in different-script bilinguals.

4. EXPERIMENT 2: TRANSLATION RECOGNITION.

4.1. PARTICIPANTS AND STIMULI. The same participants and basic stimulus types as in Experiment 1 were used.

4.2. PROCEDURE. The procedure was similar to that used in Experiment 1, with the following exception. This time, the bilinguals were instructed to decide whether the second Russian word and the English word were translations of each other by pushing the 'yes' or 'no' button as fast and as accurately as possible. They were asked *'yes' response*

	Stimulus Type	Mean RT (ms)
1.	Translation Equivalents	820.5
2.	Cognates	778.0
4.	False Friends with Real Translations	1182.4
7.	Ambiguous1 (X1, x2) with Translation of X1	1110.4
8.	Ambiguous1 (X1, x2) with Translation of x2	1170.5
9.	Ambiguous 2 (Y1, y2) with Cognate Y1	1168.3
10.	Ambiguous 2 (Y1, y2) with Translation of y2	1204.0
11.	Ambiguous 2 (y1, Y2) with Cognate y1	1087.1
12.	Ambiguous 2 (y1, Y2) with Translation of Y2	1185.2

'no' response

3.	False Friends	1724.7
5.	Phonologically Similar Words	1149.3
6.	Unrelated Words	1110.2

Table 3. Mean reaction time as a function of stimulus type.

to make their translatability judgments as general as possible. The task consisted of 138 trials and took an average of 7 minutes to complete.

4.3. RESULTS. A one-way repeated measures ANOVA was performed separately for the stimulus types that required 'yes' and 'no' responses, with stimulus type as a within-subjects variable. The mean values used in the analyses are presented in Table 3.

The main effect of stimulus type was significant, with F_1 (8, 332) = 10.5, $p<0.01$, F_2 (8, 92) = 8.20, $p<0.01$ for 'yes' responses and F_1 (2, 109) = 14.61, $p<0.01$, F_2 (2, 70) = 18.80, $p<0.01$ for 'no' responses. This indicates that word-type effects play a role in bilingual lexical processing. The key data patterns indicate that interlingual pairs sharing conceptual or lexical elements, or both, show a processing advantage. Cognates enjoyed the greatest advantage since in their case, perceptual in addition to meaning similarity facilitated translation. Pairs involving ambiguous items required longer RTs, indicating that such items activate multiple lemmas, which slows down the process of translation recognition. RTs for contextually primed and unprimed translations did not differ significantly, supporting multiple meaning activation for ambiguous words. As for non-translations, false friends took the longest to reject, which may be attributed to their misleading form similarity, which biased a bilingual toward accepting these items as translations. Similar to Experiment 1, the fact that the two languages do not share orthography did not prevent activation based on common lexical features from taking place. The pattern of results shown by different-script bilinguals on the translation recognition task was largely similar to those previously obtained for same-script bilinguals.

5. GENERAL DISCUSSION. The purpose of this study was to uncover the combinations of elements at the conceptual and lexical levels of representation that contribute to a greater degree of interlingual facilitation in Russian-English bilinguals.

#	Question	Priming	Translation
1.	Does overlap at the lexical feature level give cognates a processing advantage compared to non-cognate translations? *(Cogn/TrEq)*	YES	YES
2.	Does lexical feature overlap result in the same degree of interlingual activation (IA) as conceptual overlap? (i.e., are a word's false friend & its true translation activated with equal ease?) *(FfFf/FfTr)*	YES	n/a
3.	Is IA based on conceptual feature overlap inhibited when there is a competing candidate based on lexical feature overlap? (i.e., is IA between a word & its translation equivalent increased when the word does not have any 'false friends'?) *(TrEq/FfTr)*	YES	YES
4.	Can lexical feature overlap alone result in interlingual activation? *(FfFf/Unrel)*	YES	YES
5.	Is multiple meaning activation carried over across languages? (does a word activate all of its translations?) *(A1No, A2NcNo,A2CNo / Unrel or A1Yes, A2NcYes, A2CYes)*	YES	YES
6.	Is there an ambiguity disadvantage effect? (*A1Yes/TrEq* *A2CYes/Cogn)*	NO YES	YES YES

Table 4. Summary of issues and results[2].

To achieve this, six research questions were formulated (see section 2) and a planned comparison was performed for each of them. The results of these comparisons are presented in Table 4 (for stimulus type abbreviations the reader is referred back to Table 1).

Overall, translations with lexical feature overlap (cognates) showed a processing advantage over those with no such overlap, indicating that interlingual facilitation occurs at both levels. This result is consistent with most experimental studies of cognate processing by same-script bilinguals and with the few studies involving different-script bilinguals that have been conducted up to now (e.g., Gollan et al. 1997). Facilitation based on shared lexical features (form) occurred for Russian-English bilinguals, even though in this case form overlap is not based on common orthography.

The strength of activation based on shared lexical features finds further support in the comparisons involving false friends. An interlingual priming effect was obtained for false friends. Although such effects have been reported for same-script bilinguals (e.g., de Bot et al. 1995), false friend processing has not been examined for different-script bilinguals. In the present study, a word's false friend and its real translation were activated with relatively equal ease, suggesting that form-based activation is automatic and cannot be suppressed by conceptual-level activation. The different scripts used in Russian and English did not seem to interfere with such activation either. Therefore, an L1 word that has a false friend activates two L2 items: its false friend and its real translation. These two items race for activation and, although the true translation wins out in the long run, the false friend still gets activated. This also explains why RTs for the real translations of such items are increased compared to the translations of lexical items that do not have any potential false friends (question 3 above). Such automatic activation of a form-based link also gave false friends a processing advantage over unrelated items on the priming task. On the translation task, the above led to inhibition rather than facilitation: lexical overlap between false friends biased the bilinguals toward the 'yes' instead of 'no' response, increasing translation time. This result is in line with a previous study of same-script bilinguals by De Groot and Comijs (1995) who showed that perceptually similar items are harder to reject as translations. The present study shows that the same is true when perceptual similarity does not include shared orthography.

As for ambiguous word processing, the results indicate that multiple meaning activation occurs and is carried over to L2, i.e., an ambiguous L1 item activates both of its L2 translations. This follows from faster RTs obtained for unprimed ambiguous word translations compared to unrelated items on the priming task. Also, on the translation recognition task, primed and unprimed ambiguous word translations were processed with equal ease. Multiple meaning activation has received substantial experimental support in the monolingual literature (e.g., Swinney 1979). The results of the present study therefore demonstrate that bilingual processing of ambiguous words is essentially no different from monolingual. Translation equivalents of unambiguous words were in general processed with greater ease than those of ambiguous items, which would be predicted based on the multiple meaning activation results described above: processing proceeds slower when there are two items competing for activation. This effect was significant in most of the comparisons, and even when it was not, ambiguity was never shown to facilitate processing (question 6 above). The results of the present experiments suggest that for bilinguals, the fewer alternative candidates an item activates, the smoother processing is.

Overall, the results suggest that both conceptual- and lexical-level features are factors in bilingual processing. The general tendency was that a more complete interlingual overlap at either level resulted in stronger interlingual activation. The situation is clear-cut when two lemmas show such overlap at one of the two levels. However, it gets more complicated when more lemmas get involved and/or when there are shared features at both levels. The interaction of conceptual- and lexical-level processing can be summarized as follows:

1. In general, the presence of lexical in addition to conceptual overlap between two lemmas facilitates interlingual activation.
2. Interlingual activation resulting from lexical overlap in the absence of conceptual overlap will lead to inhibition rather than facilitation on meaning-based tasks such as translation recognition.
3. Such interlingual activation based on shared lexical features is automatic and cannot be suppressed by parallel conceptual-based activation, which may slow down processing.
4. Intralingual lexical overlap (ambiguity) results in multiple lemma activation, and L2 words sharing elements with either of these lemmas get activated. Such parallel activation of several L2 items results in slower processing.

Overall, the results of this study suggest that similar to a monolingual, a bilingual possesses a single lexical store containing items from both languages. Script does not serve as an interlingual barrier: script difference does not prevent words of one language from activating semantically and/or phonologically similar words of the other language. This suggests that it is more plausible to speak about various degrees of shared representations in bilinguals rather than common versus separate storage as two polar alternatives. Lexical items may share features at the conceptual or lexical level of representation, or both, and such shared representational elements result in intra- and interlingual activation. This study has experimentally shown which combinations of conceptual and lexical representational elements best contribute to interlingual facilitation or inhibition in different-script bilinguals.

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[1] Identical experiments with same-script, French-English bilinguals have just been completed as an extension of this study and will provide a useful comparison in a future analysis.

[2] Some of the comparisons were not possible in the translation column on this task because 'yes' and 'no' responses could not be directly compared.

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ERROR PATTERNS IN THE STORYTELLING OF A TRILINGUAL CHILD

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Multilingual first-language children—those who are growing up learning and using more than one language—provide an interesting picture of second language development. Studies of such children are important to linguistics because they provide a window on questions about how to define equivalence of levels of proficiency among the child's languages, how to establish the presence or absence of influences among language systems, and what effect environmental changes may have on the status (improvement or degradation) of one or more of the languages. In addition, these studies address with concrete data the still-frequently-expressed fear of many parents that the development of two or more languages simultaneously will work to the detriment of a child's eventual accomplishment in both or all of them.

The analysis reported in this paper is part of a more extensive longitudinal study of a single trilingual subject, SM, who is the daughter of the first author. The goals of this larger study are the following: 1) to take a panoramic snapshot of SM's current proficiency in her three languages, with special interest in the relations among fluency, comprehensibility, and grammatical accuracy; in the presence or absence of between-language influence or dominance; and in SM's narrative organizational skills in each language; 2) to develop an effective and efficient set of measures of these various aspects of trilingual ability which may be used to sample SM's language as she grows up, and, in particular, as her language environment changes when the family spends a year in the country where one or another of her languages is spoken.

The specific questions addressed in the part of the larger study which is discussed in this paper are: 1) what is the relationship between the accuracy of SM's language production and her fluency and comprehensibility; and 2) is there significant influence, and perhaps a dominance hierarchy, among her three language systems?

1. the subject. SM has from birth been reared simultaneously in English, German, and Italian. She was 7;10–7;11 when the data reported here were gathered.

1.1 language environment. SM and her family have lived primarily in an English speaking area of Canada throughout her childhood, with frequent visits to relatives in Europe and a one-year stay in Germany beginning when SM was 6;4. SM's mother is a native speaker of German, and she and SM always use German together. SM's father is a native speaker of Italian, and he and SM use Italian. SM uses English with her peers and in the larger monolingual community, but frequently speaks in the appropriate language with German and Italian relatives and family friends, either on the phone or face to face.

1.2 SCHOOLING. SM began her formal schooling with Grade 1 in Germany during the year that the family lived there. Consequently, she learned first to read and write in German. She was in Grade 2 in Canada in a German/English bilingual school at the time the present study was carried out, and had switched easily to English reading and writing. Before the beginning of her formal schooling, SM had attended an Italian Saturday kindergarten from 4;6 to 6;3, and had begun regular kindergarten at 5;6 in a German/English bilingual school, both in Canada.

1.3 ATTITUDE. SM has a very positive attitude toward her unusual language milieu. She enjoys using all three of her languages, and takes pride in being trilingual. She always responds in the language in which she is addressed, and has never exhibited the more usual pattern of the multilingual child of selecting one language for production (English would be predicted in her circumstances) and maintaining only a receptive ability in the others.

SM particularly enjoyed the task that was given her in this study, that of narrating stories in her three languages. She is an interesting and dramatic storyteller, and she seemed to view all three languages as equally good tools for this pursuit. Several different measures which are not reported in detail in this paper (e.g., length of stories, narrative cohesion, content richness) indicated that her stories in one language were not just derivative or reduced versions of those in another language, but that she approached each narration as a task to be done in the language requested and not as a task of translation.

2. TELLING THE STORIES

2.1 STIMULUS MATERIALS. The wordless picture storybooks known collectively to linguistic researchers as 'the frog stories' were used as stimuli to elicit SM's narratives. Six stories were required for the experimental design, so the five stories which are actually about the adventures of a frog (Mayer 1977, 1980a, 1980b; Mayer & Mayer 1977, 1978) were supplemented by a similar Mayer story about the trials of a hippopotamus with hiccups (Mayer 1978). The Mayer books are excellent stimuli for eliciting narration: the characters, animal and human, are engaging; the tales are substantial and concern real emotions and lively adventures; the pictures are full of rich detail.

2.2 ELICITATION. SM was asked to tell each of the six stories in each of her three languages. Before she actually told the stories, she had discussed all of the picture books with a native speaker of each language. These discussions, which were intended to familiarise SM with the story content, never involved actually telling the story by either SM or the adult discussant. Thus SM came to the task with knowledge of the content of the tales, but no actual verbal rehearsal of them.

The question of an audience for the story tellings who might be expected to understand the language SM was using was approached by nominating three of her teddybears to be, respectively, English, German, and Italian 'speakers'. SM was initially enthusiastic about this idea, and the bears were provided with appropriate ethnic names, but at the time of the tellings SM actually told the stories for her mother, whom she knew to understand all three languages.

2.3 THE DATA. SM told the stories on six days over the span of a week and a half, and the tellings were audiotape-recorded. On each recording day SM told three different stories, one in each language. The order of use of the three languages on the recording days was counterbalanced, so that in the resulting 18 stories, each language was used twice as the first language of a session, twice as the second, and twice as the last. However, upon analysis, no significant order effect appeared. Although SM claimed to like some of the stories much better than others, this also is not evident in the narrations, which showed no significant story effect. All of her stories are lively, with sound effects and dramatic voice changes to reflect the action. The actions are never just described as observed; the participants in the stories talk in individual character voices, and even the animals think aloud at times.

The tapes were transcribed, and SM's productions were evaluated by two native speakers for each language. The evaluators, a male and a female for each language, were not otherwise involved in the study. All hold advanced degrees, and are professionally involved in language studies (primarily in literature and translation); none has worked with language acquisition or bilingualism in children. They heard the tapes and read the transcriptions, and were asked to provide an impressionistic evaluation of SM's fluency, accuracy, comprehensibility, and overall proficiency in their language, and a detailed indication of non-accurate or non-standard forms in the scripts.

3. ANALYSES. As part of the larger study mentioned above, a number of analyses were made of the narrative data. In addition to the qualitative analyses and the lexical and morphosyntactic error identification provided by the native speaking evaluators, SM's narratives were analysed quantitatively for lexical richness and diversity (vocabulary size and type/token ratios), amount of between-language lexical borrowing, narrative length and content, control of narrative discourse structure, and frequency of various hesitation phenomena (filled and unfilled pauses, false starts, redirections).

In the study reported in this paper, a subset of these analyses was used to determine SM's accuracy in each of her languages. Frequency and direction of lexical borrowings and frequency, nature, and probable source of lexical and morphosyntactic errors (which will hereafter be discussed together as 'errors') were analysed in some detail. Other indicators in the data, both quantitative and qualitative, had shown that SM ranked high in fluency and comprehensibility in all three languages (see Gatto 1998 and Gatto & Stanford 1998). The picture presented by the error analysis shows far less consistency across the languages, and consequently provides a richer insight into the workings of SM's multilingual language systems. We will argue below that it also shows, in addition to developmental errors that are similar to (if more extensive and longer lasting than) those of monolingual children, negative transfers from her stronger languages (usually English, but sometimes German); at least some indications of interconnectedness between the Italian and German grammatical systems; and dominance (Romaine 1995) of the weakest language system (Italian) by the others.

4. RESULTS.

4.1 SOURCES OF ERROR. While error analysis is chiefly used in connection with second language acquisition, in SM's case it provided considerable insight into her relative abilities in her three native languages. While error analysis is not an exact science, and not all of SM's errors could be tidily accounted for, the analysis showed a great deal about the maturity and independence or interdependence of her languages.

As will be shown below, SM makes a number errors which we categorise as developmental, which might be expected in a child receiving on-going extensive input in all three languages. Review of monolingual developmental errors in English, German, and Italian (deVilliers & deVilliers 1985, Mills 1985, Clark 1985) suggests that SM's errors in this category differ chiefly in quantity from those made by monolingual children, persist to a later age, and are perhaps in some cases fossilized. They are particularly interesting in the present study because their frequency differs markedly among SM's three languages. An example of such a sort of error, discussed more fully below, is SM's consistent omission of auxiliary verbs in the Italian *passato prossimo* compound verb form.

However, throughout the 18 narratives we also find considerable evidence of errors resulting from negative transfer from one language to another, either as non-systematic mistakes or as broader systemic influences on a grammatical system. This category of error also differs in frequency by language. It is instantiated by the word order errors in German and the pronoun errors in Italian, both discussed further below.

In addition to these two primary sources of error, SM exhibits a few errors stemming from incorrect input; her father is a speaker of a regional Italian dialect, and the evaluators judged several of his forms 'non-standard' or just incorrect. There are, in the narratives, also a very few random mistakes, the source of which is not evident. Neither of these two categories is extensive enough to warrant further discussion.

4.2 QUANTITY OF ERROR. For the remainder of the discussion of errors in this paper, we will report data from only one of the six stories, *Frog Goes to Dinner* (Mayer 1977). Thus the figures presented below are based on the English, German, and Italian narrations of just this story. These narrations, however, are typical of both quantitative and qualitative observations made on the whole corpus of SM's stories.

	English	German	Italian
Errors	15*	59	205**
Clauses	112	132	107

* count includes two idiom errors not discussed further

** count includes one idiom error not discussed further

Table 1. Number of error tokens and clauses of the *Frog Goes to Dinner* narratives.

	English	German	Italian
Error tokens	15	59	205
Error types	15	25	28

Table 2. Error tokens and error types in *Frog Goes to Dinner*.

Table 1 shows the number of errors occurring in the English, German, and Italian versions of *Frog Goes to Dinner*, compared to the length of each story measured by the number of clauses that were elicited by the 22 pictures in this book. Note that the three stories are not too different in number of clauses, but they are quite different in number of errors.

However, the actual number of errors (the error tokens) is only one measure of error rate. Many of SM's errors in German and Italian were repetitive, and another useful measure of grammatical proficiency emerges if we compare actual error tokens to error types. This type/token ratio is produced by grouping each set of repetitions (tokens) of the same error as a single type error. Table 2 shows the type/token ratio, indicating the error-repetition rate in each language, and providing another picture of SM's accuracy.

While there is a dramatic reduction in the German and Italian errors when they are analysed as types, a word of warning is perhaps in order about the sorts of decisions necessary to group a collection of error tokens into a smaller set of error types. While it is quite easy to justify counting SM's frequent confusion of definite determiners *dem* and *den* in the German case system as a single error type, how should the variety of her other German determiner case errors be counted? Do all case errors count as a single type, or should different case errors be counted separately? We took the view in this analysis that morphosyntactic error categories should count as a single error type; thus all of SM's German case errors are reduced to one single type error, and in her Italian story the 49 (in one story!) omissions of an auxiliary verb in the compound *passato prossimo* tense are also one single type error. However, individual lexical errors were each counted as one error type, as were each of SM's few syntactic error patterns. While we have been consistent in this analysis in our reduction of tokens to types, more thought in the future should be given to a principled algorithm for reducing error tokens to error types.

	English	German	Italian
Borrowed words	2 (<G)	4 (<E)	8 (<E), 1 (<G)
Semantic errors	2	2	6

Table 3. Error tokens and error types in *Frog Goes to Dinner*.

4.3 CATEGORIES OF ERROR. SM's errors fell into three general categories: lexical (including borrowings), syntactic (word order), and the largest group, errors in inflectional morphology and function words.

4.3.1 LEXICAL ERRORS were relatively infrequent in all three languages. Those that did occur were of two types. There were uncomplicated borrowings from one language into another. For example, in the German story SM used the English *conductor* instead of *Dirigent*; in the English story German *der Mann* rather than *husband*; in the Italian story the English verb *laughed* for *riso*. In all of the cases of borrowing into English and German, SM knew the correct word, as evidenced by her use of it elsewhere in the narratives or in her everyday conversation; however, in most of the cases of borrowing into Italian, she did not know (when asked directly after the storytelling) the needed Italian word.

In the second type of lexical error, which we have called semantic, SM used a word from the correct language with the wrong meaning or form (often a constructed form). For example, in the English story she called 'a menu mounted on the wall' a *chart*; in the German she used the adjective *gemein* 'mean' for *böse* 'upset'; and in the Italian story she said *ancora* when she meant *più* (both mean 'again' but are appropriate in different contexts). She also constructed unique forms, e.g., **armsleeve* for 'sleeve' in the English story. Some of these words she certainly knew (*sleeve*, *böse*), and others she didn't (*più*). However, these sorts of borrowing or substitution allowed her to not interrupt the flow of her story.

Table 3 shows the lexical error frequencies for the three languages for *Frog Goes to Dinner*, with the source of borrowed words indicated by the initial letter of the lending language. The pattern suggests better knowledge of English and German lexicon than of Italian. The fact that most of the borrowings are from English suggests that lexical access for English may be faster than for the other two languages; this may be because SM is currently living in an English environment.

4.3.2 WORD ORDER errors were also infrequent, but those that occurred were interesting. The English version of *Frog Goes to Dinner* has no word order errors, the German version has eight, and the Italian has two. In many cases, the errors clearly result from transfer from English syntax. In both languages, for example, SM constructs an incorrect short genitive. In the German story she produces **der Junges Geburtstag* 'the boy's birthday' rather than the correct long form *der Geburtstag von dem Jungen* and **den Jungen's Tasche* 'the boy's pocket' instead of *der Tasche von dem Jungen*. This is analogous to the English pattern, but it should also be noted that this is a developmental error seen in quite young German monolingual children (Mills 1985), so its source in SM's narratives is unclear. In Italian, she produces **il persone's testa* 'the person's head' instead of *la testa delle persone*. In both German and Italian, she resorts to English-like adverb placement: **was ist denn los jetzt* (should be was *ist denn jetzt los*) 'what's wrong now!' and **non viene a tuo ristorante ancora* 'I won't come to your restaurant again!' (In this last example, there are other problems: *viene* is the wrong verb form, and the adverb *ancora* should be *più*, but in any case in Italian the adverb should follow the verb.) In two German sentences SM treats the particle of the separable verb as if it were an English preposition: for example, she says **da fiel der Frosch raus aus den Saxofon* (*den* is also incorrect) 'then the frog fell out of the saxophone' rather than the correct *da fiel der Frosch aus dem Saxofon* (*raus*). (The other separable particle example involves the verb *reinspringen* 'leap into' in a complicated sentence and was judged dialectally acceptable by one of the evaluators.) Verbs are placed before their complements in the English pattern in two German sentences: **wenn die war'n zu Hause* 'when they got home' (should be *wenn die zu Hause war'n*, and, of course, **wenn* should be *als*) and **der hat ganz vergessen über den Frosch* 'he had completely forgotten about the frog', (correctly *der hat den Frosch ganz vergessen*), and, in addition, in this last sentence **vergessen über* is modeled on the English two-part verb *forgotten about*. In fact, the only word order error in the *Frog Goes to Dinner* stories that does not have an evident English model is the German **so schon früh hier?* 'back already?' in which the placement of *schon* is incorrect. (Either *schon so früh hier* or *so früh schon hier* would be acceptable.)

Several points are of interest in these word-order error data. The first is that SM knew the German and Italian syntactic structures on which she made the above errors, and produced them correctly elsewhere in the data. These are performance mistakes, and not errors in grammatical knowledge. The second is that it is always English which provides the syntactic structure adverted to when the target form is missed; of the three languages, English seem to be the most easily activated. The third is simply to note in passing in how many cases a word which has a clear English cognate is involved in the English-like structure: Italian *ristorante*, *persone*; German *Geburtstag*, *Jungen*, *Frosch*, *vergessen*, *Saxofon*, *Haus*, *Glas*, *Wein* (the latter two from the *reinspringen* sentence), and to speculate about the possible role of semantic activation in sentence production.

4.3.3 INFLECTIONAL AND FUNCTION WORD errors comprised the largest and most interesting category. We classed these errors into four groups: preposition, pronoun, NP inflection (gender, number, case), and verb (stem, inflection) errors. Table 4 (overleaf) shows the number of tokens in each error group for the three versions of *Frog Goes to Dinner*.

In the preposition group, the English and German errors are chiefly caused by the incorrect transfer of prepositions, each from the other language. Two factors probably lead SM to this error. The first is that prepositions have generally rather low semantic weight, and errors in them often have little consequence in compre-

	English	German	Italian
Preposition errors	8	6	20
Pronoun errors	1	2	32
NP inflection errors	0	34	29
Verb errors			
Stems	0	2	26
Inflection	0	1	80

Table 4. Inflectional and function word error tokens by category in *Frog Goes to Dinner*.

hension. The second is that in English and German many of the preposition forms are cognates or even identical but have slightly different uses in the two languages. SM's English and German are both very strong, which probably accounts for the transfer occurring in both directions. These facts offer an account for the patterns that SM produces. For example, in the English story she says **the mom from the boy*, translating directly the German *von*; and **the turtle looked to him* (meaning 'at him'), translating German *zu*; transferring in the other direction, in the German story she says **kriegt er ihn bei den Füßen* to mean 'he gets him by the feet' rather than the correct *an den Füßen*.

The Italian errors in the preposition category are quite different. They involve SM's failure to control the very irregular Italian portmanteau forms of the *preposizioni articolate* (prepositions + articles, e.g. *in* + *la* = *nella*, see Lazzarino & Moneti 1992). It should be noted that German also has such portmanteau forms, for example *ins Kino* (*in das Kino*) 'to the movies', and SM produced these almost without error. We have interpreted the Italian preposition errors to be developmental. Although it was not possible to match SM strictly with an Italian monolingual age-equivalent group, observation of younger Italian children shows them making some of the same sorts of errors. More importantly, neither English nor German seems to have any obvious influence on the sorts of Italian errors she makes, and her error patterns show the following characteristics. She occasionally constructs a portmanteau form correctly (*alla musica*, *nella macchina*), but most are still incorrect. Her mistakes are not always the same (not fossilized), and many of them appear to result from regularization of gender and number marking (**di* for both *della* and *dalla*, **a* for *ai*, *al*, and *alla*), suggesting that she is aware of a system but does not yet well control its forms.

Neither English nor German has significant pronoun errors. However, in Italian SM shows both confusion of forms and at least one wrong assumption about the pronoun system. In *Frog Goes to Dinner* the form errors include, among others, four cases of the use of **lua/luo* as the possessive pronoun rather than the correct *sua/suo*, and seven cases of a pronoun with incorrect gender. Her incorrect assumption about the personal pronoun system appears to be based on reference to the German system, since in 17 cases she uses Italian *lei* 'she' when she means 'they' (*loro* would be the correct form) in a manner analogous to German *Sie* 'she, they'. This last example is perhaps one of the clearest cases of interconnectedness between two of SM's language systems.

The NP inflectional errors are represented by a large number of tokens in both German and Italian. SM does not make any inflectional errors in English, but the English NP inflectional system is so reduced that there is little room for error, in any case. In German and Italian, the NP inflection errors are quite different in nature. While there are a few random errors such as **das Salat* 'the salad' for *der Salat* (gender) and **ein Tag* directly from English 'one day…' to start the story (should be genitive *eines Tages*), the majority of SM's German errors are simply the confusion of *dem* and *den*, the dative and accusative case forms of the definite article. This confusion is a developmental pattern seen pervasively in German monolingual children, probably exacerbated by the acoustic similarity of the final nasals in these unstressed syllables (Mills 1985).

The Italian NP inflection errors are far more diverse, and result from gender and number confusions. While the majority of SM's NPs are correctly inflected, she makes 29 inflection errors in *Frog Goes to Dinner* and they show no consistent pattern. While she sometimes correctly says *una persona* 'a person' with both article and noun feminine, she also produces **un persone* with an incorrect masculine singular article and a correct feminine plural noun, **un persona* (masculine article and feminine noun), and **due personi* 'two people' with a masculine plural noun. She produces *rana* 'frog' correctly as a feminine noun, sometimes correctly collocated with feminine determiners *la* 'the' and *una* 'a', but also incorrectly with masculine forms like *mio* 'my' and *il* 'the'. The phrase *tutta la gente* 'all the people' (feminine singular) is produced as **tutti* (plural) *la genti* (masculine plural). Such errors are certainly intralanguage in origin, although Clark (1985) does not specifically discuss them as developmental. Perhaps the most general statement that can be made is that it appears that SM's control of Italian NP inflection is automated to the extent of producing inflectional markings, but not to the extent of consistently producing the correct ones.

In the verb error group, SM makes no errors in English, and only a few in German in *Frog Goes to Dinner*. The German errors are regularization of irregular stems, which Mills (1985) identifies as a developmental error of German monolingual children, and one case of an incorrect auxiliary in a compound tense—an interesting error since the auxiliary selected would have been the correct one in English. SM's Italian verb errors, however, are again very interesting, as well as very numerous. (SM got only 12 verb forms correct in this story.) The verb errors fall into two categories: verb stem errors and verb inflection errors. The verb stem errors most frequently concern the regularization of irregular past participles, since they occur commonly in past-time narration in Italian. (Clark 1985 comments on this as a common developmental error in Italian monolingual children.) For example, in place of *preso*, the irregular past participle of the verb *prendere* 'to take' SM constructs a more regular **prenduto*. And for one high-frequency irregular verb (*andare*, 'to go') she constructs a regular past participle on the wrong stem form: she consistently produces **vato* from the 3rd singular present form *va* 'he/she goes' to which she adds the regular past participle marker *-to*. (The correct past participle of *andare* is *andato*.) The **vato* error alone occurs ten times in *Frog Goes to Dinner*.

As for SM's Italian verb inflection errors, the majority are errors or, more commonly, omissions of the auxiliary verb in compound tenses, particularly the *passato prossimo* which she correctly attempts to use for a past-time narration. Forty-nine such errors occur in the story, with frequent repetitions of **detto* for *ha detto* 'said' and **saltata* for *è saltata* 'jumped'. In spite of the fact that both English and German provide her with models of compound tenses very similar to those in Italian (and she produces such forms correctly in those languages), SM has apparently established a rule in Italian that the *passato prossimo* consists of a bare past participle with no auxiliary. While this may be a developmental stage for very young Italian monolinguals (as it is in very young English monolinguals) it is not a form which would persist to SM's age. The forms appear to have fossilized, and it is worth noting that they do not show the sometimes correct / sometimes incorrect variability that SM's Italian preposition and NP inflection errors do. It will be of special interest to see whether time in an Italian environment causes equivalent improvement in all three of these error types.

To summarise briefly the preceding catalogue, what we see in SM's error patterns in *Frog Goes to Dinner* (as in the whole corpus) is a combination of developmental errors, some of which may be fossilized; simple (and often ad hoc) negative transfers from one of her other languages—most often from English, although sometimes from German; and, at least in the matter of Italian pronouns, a confusion of part of the system with the German pronominal system.

5. CONCLUSIONS. What should we conclude from these data about SM's proficiency in her three languages, and perhaps more generally, about childhood multilingualism of her sort? The most obvious conclusion about SM's languages is that she is far less grammatically proficient in Italian than she is in English or German, in which her skills seem relatively comparable. This is clear when we look at the quantity of errors in the three languages. It is even more evident when we look at the nature of the errors in each language. In the category of lexical borrowing, English and German borrow lightly from each other, but Italian borrows quite freely from English. All three languages exhibit a few intralanguage semantic errors. SM's English narration contains few significant errors; the only ones of real interest are the small set of bi-directional transfer errors with German prepositions (see discussion above). SM's German, aside from the just-mentioned prepositions, has primarily developmental errors in NP inflections, analogous in type if not in number to those of a monolingual German child although one of a slightly younger age; some verb stem regularization; and a few interesting syntactic word order errors perhaps transferred from English. SM's Italian, however, is characterised by the combination of a number of transfer effects and quite extensive and persistent

developmental errors, at least one class of which may have fossilized (see *passato prossimo* discussion). The error analysis thus appears to show the picture of three languages developing in parallel, with one, Italian, weaker than the others, and dominated in some aspects by them.

We may conclude further that, however revealing SM's error patterns have been about her relative grammatical accuracy in her three languages, the complete picture of her proficiency must be based on more than an error analysis. In SM's language we do not find a trade-off between accuracy and fluency nor between accuracy and comprehensibility. Despite SM's differing levels of accuracy in English, German, and Italian, her evaluators judged her to be communicative and fluent in all three languages. While the evaluators' view of her fluency may be somewhat coloured by SM's dramatic gifts as a storyteller and her paralinguistic techniques for enriching her narration, the quantitative measures of vocabulary, story length, paucity of hesitation and redirection, and narrative cohesion substantiate their views (see Gatto 1998 and Gatto & Stanford 1998). The question of comprehensibility, moreover, raises an interesting observation. It is that SM's errors, and in particular the numerous Italian errors, occur primarily in inflections and function words. Such elements tend to be redundant and hence low in information weight; they often have more of an error-correcting function in language than a significant semantic value (a characteristic which may make them difficult to eradicate). This means that, given a fluent narration, comprehensibility may be little interfered with by even the fairly high level of grammatical inaccuracy that SM's Italian stories exhibit.

The final conclusion is that this detailed error analysis,taken in conjunction with the additional measures of fluency and accuracy, has provided useful baseline data for further study of SM's trilingual development. In general, it provides a tool for measuring the relative strength of aspects of the languages of a multilingual child, and also possible changes in those strengths with a change in language environment. In SM's case, these measures, to be taken again in 2002 when she has spent a year in Italy and completed Grade 6 in an Italian school, will yield interesting quantitative data on the changes brought about in this multilingual child by alteration in the linguistic environment in late childhood.

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RIGHT HEMISPHERE INVOLVEMENT IN THE PROCESSING OF FIGURATIVE MEANING IN BILINGUALS

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Clinical studies with monolingual speakers have shown that the right hemisphere contributes to the semantic processing of words (Joanette et al. 1988), and that it plays a special role in the identification of emotion words (Lorch et al. 1998; Pulvemüller 1998), and in the appreciation of the figurative meaning of words (Brownell et al. 1984, 1988, 1990). A PET study with normal subjects (Bottini et al. 1994) showed activation of a number of sites in the right hemisphere during a metaphor comprehension task. Given that figurative meaning is language/culture-specific, the present paper wishes to examine the role of the right hemisphere in the appreciation of figurative meaning in bilingual speakers. Furthermore, hypotheses will be presented about the possible patterns of recovery in bilingual right hemisphere damaged (RHD) individuals, based on previous studies with monolingual normal and right hemisphere damaged subjects.

1. theoretical definitions. First, it is necessary to distinguish between the terms 'metaphor', 'connotation' and 'figurative meaning', which seem to be used interchangeably in the literature.

According to Paradis (1998), a 'nonce metaphorical meaning' is an interpretation derived from the particular context in which an utterance is produced, without a conventional figurative meaning. In other words, the meaning is not listed as such in the lexicon; it must be inferred from the circumstances of the use of the word, e.g.:

(1) 'The police officer was a brick wall'.

'Connotative meaning' refers to secondary meanings commonly associated with a word, i.e., qualities, feelings, situations suggested by a word both conventionally (i.e., language/culture specific) and personally as influenced by personal experience. Connotative meanings are not listed in dictionaries, and there is also much interindividual variability, e.g.:

(2) *spinster* denotation: 'unmarried woman'
connotation: 'nasty/old unmarried woman'

‘Figurative meaning’ refers to a conventional metaphorically-derived meaning listed as such in dictionaries, sometimes as ‘secondary’ meaning, usually opposed to literal meaning. Thus, it may be assumed to be listed in the lexicon, e.g.:

(3) *warm* literal meaning: ‘hot’
secondary meaning: ‘loving’

2. MONOLINGUAL STUDIES. I will now review some of the monolingual studies on the appreciation of figurative meaning. Studies by Brownell et al. (1984, 1988, 1990) have examined whether lexical denotation and connotation, referring actually to literal and figurative meaning, are dissociable. In these studies, unilaterally left hemisphere and right hemisphere damaged patients were presented with word triads and were asked to group together the two words that were closest in meaning, e.g.:

(4) ‘deep’ ‘shallow’ ‘wise’

The results showed that right hemisphere damaged patients (RHDs) relied mostly on the relation of antonymy, whereas left hemisphere damaged patients (LHDs) relied on metaphor. Normal controls demonstrated greater flexibility and used both relations. Thus, Brownell et al. concluded that brain damage appears to dissociate these two principal aspects of word meaning, and to focus patients on either denotation or connotation, in contrast to normal individuals who can exploit either or both facets of meaning.

Brownell et al. also contrasted the performance of RHDs and LHDs with metaphoric and non-metaphoric polysemous words, by using triads of words and asking the subjects to pick the two words that were most similar in meaning, e.g.:

(5) metaphoric: ‘warm’ ‘loving’ ‘blanket’
non-metaphoric: ‘suit’ ‘trial’ ‘tailor’

RHD patients were found to be selectively impaired in their appreciation of metaphoric alternative meanings relative to non-metaphoric alternative meanings. Brownell et al. concluded that the right hemisphere is critical for the identification and evaluation of metaphoric extensions of dominant literal meanings.

In a PET study, Bottini et al. (1994) compared cerebral activity during the comprehension of literal and metaphorical sentences. Comprehension of metaphors was associated with activations in the left hemisphere similar to those for literal sentences, but in addition, a number of sites were activated in the right hemisphere, including the prefrontal cortex, the middle temporal gyrus, the precuneus and the posterior cingulate. They concluded that the interpretation of language involves widespread distributed systems with the right hemisphere having a special role in the appreciation of metaphors.

Conceptual System	
L1 Lexical-semantic system	L2 Lexical-semantic system
L1 Syntactic System	L2 Syntactic System
L1 Morphological System	L2 Morphological System
L1 Phonological System	L2 Phonological System

Figure 1. The three-store model (Paradis 1997).

All previous studies on the literal and figurative meanings of words, and on the dissociation of the two in clinical populations suggest that a normal individual's knowledge of word meaning is in reality a sum of separable conceptual features that are (1) mediated by different parts of the brain, and (2) devoted to different types of semantic information. Understanding utterances in everyday conversation involves more than just the comprehension of literal meanings. In order to appreciate everyday speech, we also need to be able to grasp the figurative meanings of words. It is this ability that seems to be impaired in right hemisphere damaged populations.

3. THE BILINGUAL LEXICON. Previous studies, reviewed in this paper, have only looked at the RH participation in language processing in monolingual speakers. Since no studies have yet been conducted on bilinguals, predictions must be made based on monolingual studies and on the evidence that exists about bilinguals from studies on the left hemisphere.

I assume Paradis's 1997 model of bilingual memory which distinguishes between two levels of representation for each language, one lexical, storing word forms, and the other conceptual, storing features by which meanings are composed. There are two lexicons, one for each language, as well as a single separate conceptual store, irrespective of the number of languages (Figure 1).

Each language, in the left hemisphere, is represented as a modular system, divided in terms of linguistic structure. Words in each language are represented as a matrix of features, including semantic specifications, connected to one common system of conceptual representations independent of language. Each lexical item determines what conceptual features are activated when the word is used. Conceptual features are non-linguistic.

The conceptual system is neurofunctionally independent and isolable from the language systems. Each linguistic system can be dissociated from the other, and both can be dissociated from the conceptual system. In non-brain damaged speakers, however, each language system is connected to, and interacts with, the conceptual system (Paradis 1997).

The question now arises as to how the right hemisphere participates in the appreciation of figurative meaning. Since language is assumed to be mainly subserved by the left hemisphere, I will offer a hypothesis concerning the right hemisphere participation in the understanding of figurative meaning.

Based on the studies with RHDs and PET reviewed above that show an involvement of the RH specific to figurative language, I hypothesize that the specific conceptual features that mark figurative meaning are represented in the right hemisphere. I will refer to this as the Right Hemisphere Features Hypothesis.

If we assume that when interpreting figurative meaning we have to overcome the established literal meaning, even in cases where the figurative meaning is part of the lexicon, then extra processing is needed. Since the LH is already fully exploited for the interpretation of the conventional, literal meaning, the RH is called for.

Furthermore, pragmatic impairments have been attested following right hemisphere lesions, so one could expect these features to be subserved by neural networks in the right hemisphere. These neural networks could be part of the neural substrates that subserve the pragmatic system which seems to be neurofunctionally independent of language. Thus, when encountered with a word with a figurative meaning, apart from the connections that are activated in the left hemisphere, extra connections need to be activated in the right hemisphere in order to interpret the word. Since each language is a subsystem with a separate network of connections, it should be expected that, in the case of pathology, the connections of each subsystem with the features that mark figurative meaning could be selectively inhibited/impaired, making figurative meaning unavailable for the specific language.

4. PATTERNS OF RECOVERY. If the hypothesis that conceptual features that mark figurative meaning are subserved by neural networks in the right hemisphere is true, we should expect to find in bilinguals with dyshyponoia the different patterns of impairment and recovery attested in bilingual aphasics, and described by Paradis (1977, 1987).

Dyshyponoia comes from the Greek word *ὑπονοῶ* which means to grasp what is implied in an utterance, albeit not said. It is the impairment of linguistic pragmatics, the inability to draw appropriate inferences from the context or from general knowledge, leading to problems in the interpretation of indirect speech acts, metaphors, and in general of the unsaid component of an utterance (Paradis 1998).

In particular, appreciation of figurative meaning could be impaired selectively for each language, or in parallel for both languages. Parallel impairment in bilingual dyshyponoiacs could be interpreted as a result of inhibition of the pragmatic system as a whole, and differential impairment as a result of inhibition of the connections of each of the languages with the conceptual features that mark figurative meaning.

Various patterns of recovery should also be expected, similar to those found in bilingual aphasics. In addition to parallel recovery where access to figurative meaning should be recovered for both languages at the same rate, differential recovery patterns are expected to be attested, such as:

1. Differential recovery, where access to figurative meaning should be better for one language than for the other.
2. Successive recovery, where access to figurative meaning in one language should be recovered after it has been maximally recovered in the other.
3. Selective recovery, where figurative meaning in one language is not recovered and remains forever unavailable.
4. Antagonistic recovery, where better recovered figurative meaning in one language deteriorates as it improves in the other.
5. Mixed recovery, where the patient applies the figurative meaning of a word from one language to its translation equivalent in the other language which, nevertheless, does not have the same figurative meaning.

As in bilingual aphasia, these patterns of recovery should not be mutually exclusive.

5. TESTS. However, as no evidence from bilingual dyshyponoiacs is available at this point, only hypotheses can be proposed. Tests should be developed to examine the appreciation of figurative meaning in both languages of bilingual normal and dyshyponoiac speakers, and look for evidence for the patterns of impairment and recovery predicted above. These tests could form a continuum from literal meaning to figurative meaning.

Sentences to test comprehension of literal meaning, figurative meaning and unconventional metaphorical meaning should be constructed for both languages of bilingual speakers. For example:

(6) 'It is a warm day'.
'He is a warm person'.
'He was a warm oven because of his high fever'.

Subjects would then be asked to choose from a set of multiple choice interpretation sentences the one that best conveys the meaning of each sentence.

This way, we will be able to test the different meanings of words from the literal, to the figurative which is listed in the lexicon, to the unconventional metaphorical meaning which is not listed in the lexicon, and observe which facets of meaning are lost in dyshyponoiacs. It is expected that the most severe cases will have problems with the appreciation of figurative meaning of frequent words as well as with unconventional metaphors. Milder cases, however, should present problems basically with the appreciation of metaphors but not so much with figurative meaning. The more unconventional the meaning that has to be derived, the more demanding the process in the RH.

Another test which should be constructed would include words that have different figurative meanings in the two languages of bilinguals. For example:

(7) 'Mary is a cat'.

In Greek, the word ‘cat’ has the figurative meaning ‘a clever, quick thinking person’. In English, it means ‘nasty’. The subjects could be given multiple choice interpretation sentences, for example:

(7)' ‘Mary is nasty’.
‘Mary is clever’.
‘Mary is cute’.

and then asked to pick the one that best conveys the meaning of the original sentence. Sentences would be provided for both languages of bilinguals. Depending on the language in which the task is presented, the appropriate interpretation sentence has to be chosen.

It is expected that in the most severe cases of dyshyponoia where figurative meaning is inhibited for both languages, the literal interpretation will be chosen. In milder cases, however, and depending on the pattern of recovery, patients might choose an interpretation that conveys figurative meaning, although it might be for the wrong language.

6. CONCLUSION. To conclude, I have argued that the interpretation of figurative meaning relies on the capacities of the RH. I have offered the Right Hemisphere Features Hypothesis to account for the participation of the RH in the interpretation of figurative meaning, and described the patterns of impairment and recovery that I expect to find in bilingual dyshyponoiacs. Finally, I have discussed tests that would look for evidence for the patterns of impairment and recovery predicted.

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HOW POLYGLOTS ENLARGE THE LEXICON OF THEIR PRIMARY LANGUAGE

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The circumstance that many persons know more than one language complicates the effort of linguistic scholars to come up with a comprehensive account of the words used in any given language. On the practical side of linguistics, a book entitled a dictionary or a lexicon, unless deliberately abridged[1], ought to adhere to some rational policy regarding the words that are used mainly by those who know another language well and have introduced them from there. On the more theoretical side, we need to consider what criteria, if any, justify putting such words aside as though irrelevant to an ideally full description of the language, which would include many other words of quite limited currency, occupational or regional, but not at all foreign.

The term *lexicon* has come to be understood, within the linguistic profession, no longer as an actual, physical book, however large, but as an all-inclusive theoretical list—not necessarily nor in principle alphabetical[2]. It takes in everything there is to learn about a language, apart from what falls under the heading of grammar (subdivided into phonetics, morphology and syntax). But whereas the grammar is shared completely, or almost completely, by all the individuals who have been immersed in the language—allowance being made for differences of dialect or register—a substantial part of the lexicon is less widely shared. Unless a language community somewhere is very small and utterly isolated, there are bound to be adults using some words that other adults do not use or understand.

Now of course the purview of linguists, either practical or theoretical, is not limited to what is appropriately termed the *common vocabulary* of a language, which all or nearly all the adults share and which (as I have said) is substantially smaller than the total lexicon. A book so circumscribed would have little appeal, except to check spellings; we consult a dictionary most often for the meaning of a word that we don't already know. But granted that linguistics is concerned with more than the common vocabulary, how can it stop short of the entire language, embracing all that any users of it draw upon to communicate with one another?

This, however, runs into intractability—all the more so because of polyglots. Monoglots too have words outside the common vocabulary of their language. For example, among Englishmen the colliers (or coal miners) of Lancashire use words peculiar to their working environment, which are seldom heard by neighbors—shopkeepers, policemen, ministers, auto repairmen, etc. Those words belong to no other language than English, whether or not they are documented in writing and no matter how they originated. For those English miners have, in effect, been out of contact with foreigners for many generations.

But it could be argued, on the other hand, that the many Spanish words and phrases which the children of immigrants from Latin America mix into their English have no place in the English lexicon—however we may define it—unless or until they are picked up by English monoglots. This is the chief issue of my inquiry. For there is no room for dispute about *macho* or *fritos*, as they are in the vocabulary of millions of monoglots, including a large number that are (at most) dimly aware of the source being Spanish and pronounce the plural ending of *fritos* with an English voiced [-z] instead of the original voiceless [-s][3].

But when the bilinguals say *mi tío* rather than *my uncle* in the midst of an English sentence, as they often do, it is at any rate debatable whether this signifies that *mi tío* has already entered the English lexicon. It has good prospects of remaining current in an English context, well embedded, for a long time into the future, because immigration from Latin America, either legal or surreptitious, shows no sign of dropping off. So, even if the grandchildren or great-grandchildren lose their heritage of the Spanish language, as many other nationalities in the United States have lost theirs, Spanish-English bilingualism will still be continually renewed. And as long as the uncle in a typical Latino family matters more than in a typical Anglophone family, the bilingual children will quite naturally retain a motive for speaking of *mi tío*, even though they learn to say *my mom and dad* in preference to *papá y mamá* or to the more formal *mis padres*[4].

From this example, and similar ones, I infer that linguistics as a social science ought, when dealing with bilinguals, to pinpoint those words or phrases from one language which they use recurrently in the other. Not all the Spanish they know becomes a real part of their English, but only what they actually use while speaking English. Knowing both languages does not make the Spanish and the English word interchangeable. It is quite unlikely that they would say *my uncle* in the midst of a Spanish sentence—unless perchance he were an Anglophone married to *mi tía*[5].

Even so, I hesitate to admit that *mi tío* (or *mi tía*) is part of the English lexicon, just because it is part of some people's English. For by that token the bounds of English would be expanded enormously, so as to embrace everything that the polyglots all over the world resort to when speaking or writing English. Theoretically, to be sure, there may be enough linguists willing and able to take account of all the out-of-the-way phenomena of Korean-English bilinguals, as well as Tamil-English, Maltese-English, Tagalog-English bilinguals, and so on and on.

A systematic study of the vocabulary of certain bilinguals could serve a worthwhile purpose, without aspiring to be exhaustive. If you were to compile a sizable glossary of Spanish words not found in any English dictionary but often occurring in the English of the bilinguals, it might become a handy reference book for English monoglots, who would not otherwise make sense of what is said around them. As things stand, the available books are ordinary Spanish-English dictionaries, most of whose Spanish words never turn up in any English context outside of a bilingual dictionary, or a class dealing with the Spanish language but conducted in English.

Dictionaries and language classes are indeed instrumental in spreading knowledge to individuals who were previously ignorant. For my present inquiry, however, what they contribute to enlarging the lexicon of one language seems minimal and indirect. There have been some whose approach to bilingualism did begin in school; but they went on to become so steeped in the second language that whenever they had occasion to discuss a similar topic in their native tongue, they simply brought in words from their school language. Much of the Latinate vocabulary in English goes back to that sort of bilingualism. Take the Latin noun *spiritus*, most familiar from several Biblical passages. In the Lindisfarne Gospels it had been glossed *gæst*; but from Middle English on, this native word was used less and less in such contexts, and now it hardly survives apart from one archaic formula: *the Holy Ghost*. Meanwhile, *spirit* has not only taken over the meaning of *spiritus* from the Latin Bible but has branched out within English so that we can even speak of the *spirit of the dormitory*, or the *spirit of the computer network*[6].

The foreign origin of this noun does not in the least diminish its standing in English. Most Anglophones use it without knowledge of Latin; indeed, for a synchronic study of current English the Latin *spiritus* is irrelevant. But we also have quite a few Latinisms, unaltered except for adjustment to English phonology; some of them, such as *propaganda*, are by no means limited to Latinists, while others, such as *procurator*, are so specialized that they hardly ever turn up outside of a discourse on ancient Rome[7].

The Oxford English Dictionary marks 'alien' entries with a double vertical line; e.g., ‖ **adagio**. This depends upon an editorial judgement, which I commend in principle; for it recognises there are foreign words that enjoy some marginal currency in English. However, *adagio* is in the vocabulary of many Anglophones who, apart from the realm of music, have acquired very few Italian words. They know quite well the title of the beloved opera *La Traviata*, but they understand the Italian phrase only through the literal but really inaccurate rendering 'the lost one'[8]. The opening words of an aria from *Rigoletto*, 'La donna è mobile', they also know, and may have learned that it means 'Woman is fickle'. Such bits of Italian are part of the English language; they have won an apparently permanent place in the lexicon. But it leads to a paradoxical inference: that the English lexicon includes anything and everything from the outside world, if it has obtained a foothold among some Anglophones who have no command of the source language.

By that criterion the names of all persons and places, talked or written about by our English monoglots, exist in their lexicon. I would draw a somewhat zigzag line: For instance, in Israel an English telephone directory is printed for residents or visitors who cannot read Hebrew; but only the names and addresses that the Anglophones actually look up should be reckoned as belonging to their English. The many listings that their eye passes over without a pause are not English, except perhaps in the most tenuous sense. Likewise, not every entry in the gazetteer of a world atlas is really an item of the English language, nor is every town, every river that is marked on each map in the book—only the ones that Anglophones pay attention to. Large amounts of such data are indeed *accessible* to anyone literate in the Latin alphabet; a visitor from Tibet, with only that meager knowledge (and possibly a smattering of some European language), could profit from consulting ref-erence books of those kinds.

In general the names of streets, aside from a few famous ones like *Downing* in London and *Champs Élysées* in Paris, are of purely local interest—taking in,however, those who live far away but have occasion to address an envelope. I have written letters to relatives on Saloma Avenue in Los Angeles and to an acquaintance on Jan Zwartlaan in Oegstgeest (Netherlands); I gather that the English noun *lane* has a cognate in Dutch, although I have not learned that language[9]. A hypothetical book assembling the corpus of street names from all the Anglophone countries—not to mention the rest of the world—would require too many volumes to fit on one shelf in a library. But it would contain data of great relevance to linguists concerned with the patterns or cultural fashions that have affected the choice of names, and with the extent to which the names represent more than one language or nationality. Maybe a computer disk will tap into this part of the English lexicon and make it available for research.

Now *Jan Zwartlaan* has the slenderest of footholds in my personal vocabulary; I write it on the envelope before mailing a letter, already written in English, but I need not keep the address in mind; for I know where to look it up. Is any other Anglophone, outside of the Netherlands, at all aware of this street name? My guess is that travelers from England, more often than from America, go past Jan Zwartlaan and may even stop there. If so, this Dutch expression will figure in English discourse, but very intermittently. On the other hand *Saloma*, besides the permanent street signs, is on the lips of hundreds of Anglophones in Los Angeles every day, especially in the section called Van Nuys, whether they are ordering pizza to be delivered or picking up mail at the post office, or whatever. For them it is an indispensable word; so it would seem to deserve some individual notice from linguistic researchers, and yet no more so than thousands of other street names deserve in that one metropolis. They have not attracted their share of attention, even from those who expressly concentrate upon dialectal or regional features of American English.

Some kinds of data are, in fact, more prone to neglect; for the energy, the curiosity, the resources of our profession are not boundless. I maintain, however, that out of the totality of phenomena we have considerable precedent for emphasizing any *overlap* between languages, or the influence of one language upon another. While I acknowledge that Saloma is just one of many quiet side-streets in a plain residential neighborhood, it fascinates me as a vestige of the Spanish colonization. Not that the street itself goes back to the time of the viceroys and the Franciscan missions, but *saloma* as a common noun means 'a (sailors') shanty'[10]. Granted that few residents of Saloma Avenue, if any, have an inkling of this or think at all about etymologies, I find a lesson worth pondering for linguists. In extreme cases a word transferred from language to language loses its meaning and retains nothing but a vague suitability to serve as a particular sort of label. *Saloma* is appropriate for a street in an American city that takes some pride in its Hispanic heritage; that is all.

But under some circumstances the adopted term becomes meaningful in quite a new way. The name *San Francisco*, as a city in the United States, evokes for us a great deal that is altogether detached from our understanding of *Saint Francis* himself. As long as it was a Spanish town, the connection between the man and the place named after him was close: to those people he was indeed the patron saint; for the public religion there had singled him out of all the saints, ever since the friars set up that mission furthest north along the Pacific coast. After 1846, however, the Hispanophones were swamped by settlers, mostly Protestant, from the Eastern states, who kept the Spanish name in an Anglicized pronunciation[11] but went on to build up a large and famous city of very different character from the old San Francisco. Nowadays, to Hispanophones in any part of the world, *San Francisco* stands for both a well known person and a well known place; the educated among them are aware of a *past* connection between the two.

All this should alert us to some things about the lexicon of a language: it embraces a broad range of information and sentiment, and at any particular time some of the lexicon taps into words or meanings that are gone from current use but not utterly forgotten. It is an immense repertory of words packed with meaning. At that it is not the sum of what all the individuals in the language communiity know, or think, about everything; but still it is immensely large, taking in all that they *communicate* to one another in speech or writing: not merely what the experts know about the terms pertinent to a certain subject but also, or even more, what the words mean to people of ordinary intellect. Their misunderstandings too, when shared, become part of the lexicon; e.g., taking *it transpired* to be a fancy synonym of 'it happened'.

Encyclopedic dictionaries profess to give not just a definition of each word, sufficient for a reader previously ignorant of it, but a further statement of what any well-informed person should know. Among such dictionaries, the fullest have gathered a very small part of the contents of a theoretically comprehensive lexicon. But with so many specialized fields of knowledge being pursued within the Anglophone world, it may be chimerical if we linguists aspire—let alone, if we lay claim—to a command of the English lexicon as a whole, unless some linguist is also an expert on asteroids, another on computer technology, a third linguist on molluscs, a fourth on patent law, etc.

The fact is that our profession includes many who are expert in specific languages besides English; and what they know about those languages is beyond the *English* lexicon, even though they conduct a discussion in English with one another about certain details—for example, the distinction between the Latin nouns *femina* and *mulier*. It would be absurd to infer that thereby these Latin words have entered English. But on nearly the same principle a technical term of zoology such as *amphipneust*[12] is, at best, on the fringe of the English lexicon—a very wide fringe, to be sure.

Unequal prominence characterizes the innumerable items of the lexicon; and as serious linguists we are bound to take into account this sort of gradation. The usual format of a dictionary, however, gives the opposite impression, each lemma being presented in equally bold type. The dictionary may comment, in italics, *Now rare* or something to that effect; and to those who consult it, guidance of this sort is welcome. Ideally the experts on each and every field of vocabulary should be able to go much further than that and define, for each word, the extent and frequency of occurrence. I am not suggesting a numerical definition of this, although it might be worthwhile—given a computerized database of many billions or trillions of words.

My essential point is that to be aware of the extent and frequency of a word falls under the broader awareness of *context*. Modern linguistics has established the principle that the meaning of each word—what it communicates—is bound up with the contexts in which it occurs, verbal as well as non-verbal. As lexicography developed slowly over many centuries, one of the main shortcomings was that often the collectors of glosses, such as Hesychius early in the Christian era, simply *abstracted* them from the margin of a classic text, where the context had been at hand for any literate person to grasp; but when a gloss—e.g., *βήϰη · χίμαιϱα* /bɛ̄́kɛ̄ kʰímaira/[13]—was incorporated in a separate alphabetical list, the context was gone, and a user had to interpret it as best he could. That pattern persisted as industrious scholars enlarged the glossaries into more and more comprehensive dictionaries. Gradually they came to realize the utility of citing one or more contexts to clarify the actual usage of a word, but only the great *Oxford English Dictionary* does this on an adequate scale.

The part of the lexicon of any language that has grown obsolete is naturally the most disregarded, unless an item through some fluke escapes oblivion. The Greek glossators deserve credit for saving quite a few while they remained accessible. Of some of them we lack any clue to that previous existence, still less of the circumstances of their disappearance. Nevertheless in certain rare instances their descendants have turned up in modern Greek dialects (Shipp 1979:43–45, etc.).

My final example of bilingualism brings out an effort to draw upon the lexicon of a modern language, through a translator struggling to make clear an extraordinary passage of Leviticus (16:8,10,26), which had already caused confusion among the ancient translators. It describes the two goats, one of which was sacrificed to the Lord, while the second was let loose in the wilderness—according to the original Hebrew—לעזאזל /lˁzʔzl/ ‘for Azazel’, a problematical word. William Tyndale (1530) in Lev. 16:10 took it as equivalent to an infinitive ‘to scape’. But in 16:26 he rendered the Hebrew ‘the goat for לעזאזל as the English compound ‘the scapegoat’, not known to have existed in the English lexicon heretofore, although possibly it did in the speech of illiterate herdsmen.

Anyhow, from this Biblical passage educated people have drawn a powerful figurative term for a human being, like the second goat upon which all the iniquities and transgressions of the sons of Israel were laid. The current sense of *scapegoat* in English, however remote from the ancient Hebrew setting, does focus upon the disproportion between the guilt of the one singled out and that of everyone else ready to put the blame of him for what is much more their fault than his.

The morphological components of *scapegoat* were taken from within English and do not, in themselves, show any dependence upon Hebrew. But if not for an English Hebraist's access, somewhat restricted, to this ancient language, we would have no such word in the English lexicon[14].

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[1] A desk-top dictionary, for the sake of commercial success, cannot be expected to acknowledge on the title page that it covers only part of the words in the language, nor to state explicitly what kinds of words are left out.

[2] *λεξι**κόν***, with its neuter ending that has been preserved in English, was originally an adjective agreeing with the neuter noun *βιβλιόν* {biblíon} 'book' (expressed or unexpressed). The Latin *dictionarium*, or *uocabularium*, is neuter but with no Latin neuter noun in the background. *Lexicon*, Latinized only the extent of substituting the Latin letter *C* for the Greek *K*, has been adopted since the Renaissance, but in a restricted context: the terms proper to a special technical field and taken largely from Greek (such as *Lexicon plantarum*). By nearly the same token, in modern times *A Greek-English Lexicon* (by Henry George Liddell and Robert Scott) is a perfectly fitting title, and by extension *A Hebrew and English Lexicon of the Old Testament* (1827) or *An Arabic-English Lexicon*; but we prefer to say *Latin-English Dictionary* and likewise for other languages written in the Latin alphabet: *German-English and English-German Dictionary for Scientists* (1950), etc.

[3] Those monoglots who feel more than the average curiosity about languages may surmise a connection of some sort with the English participle *fried* (or the verb *fry*). But only by a bit of research would they discover the etymological correspondence between *macho* and *male* (< French *mâle* < OFr. *masle* < Latin *masculum*).

[4] Princess Maria in Tolstoi's great novel *Война н мнр* /voĭna i mir/ (*War and Peace*) says to her father, '*Hem*, *mon père*' (Vol. III, part 2, ch. 2) and similarly in other passages. A footnote in the Moscow edition from 1940 glosses the French phrase somewhat misleadingly as *батюшка* (/batjuška/ = 'papa'); Tolstoi's Russian readers in the nineteenth century were expected to know French. In a noble family it was common for the girls to be brought up by a French governess. Maria during her child-hood had presumably not been in her father's company enough to make a habit of addressing him by the ordinary Russian pet name. Instead the governess had taught her the proper French way to refer to him, and for lack of any contrary influence it was carried over into the young lady's Russian.

My colleague, Prof. Zoja Pavlovskis, notes the possibility that *mon père* and other French phrases were intended as a literary device, hinting that the fictional conversation between Russian aristocrats was conducted in French although written up mainly in Russian to harmonize with the Russian narrative. French had indeed been the preferred language of much of the Russian nobility (as Tolstoi pointed out elsewhere in the novel) until their patriotic pride reasserted itself during the Napoleonic war.

[5] To be sure, a 'macaroni' creation—out of sheer exuberance—could indulge in virtually any sort of juxtaposition. The boy genius Mozart in a letter to his sister wrote a mixture

of Italian and German, 'à una schnoffelte voce, e canta sempre um ein vierteil zu tardi, ò troppo à buon ora' (Mozart 1962:301).

On several points that involve Spanish I have profited from the counsel of Prof. Salvador Fajardo.

[6] Lindbergh's airplane was named *the Spirit of St. Louis* in gratitude to generous backers from that city. Moreover, as his destination was Paris, the name also alluded quite appropriately to the saintly warrior king of France in the thirteenth century.

[7] The English translation of a short story by Anatole France about Pontius Pilate, *Le procurateur de Judée*, has introduced this Latin term to some readers unaware of it otherwise.

[8] 'Lost' leaves unexpressed an essential part of the meaning of *traviata*: gone astray morally. Around 1857, a few years after the première of the opera in Venice, it gained sensational, unprecedented popularity all over London, together with two other works of Verdi. A contemporary jingle captured that succès de scandale:

'Three *Traviatas* in different quarters,
Three *Rigolettos* murdering their daughters,
Three *Trovatori* murdering their brothers*
Through the contrivance of three Gypsy mothers'.

[*note the correct Italian plural, in contrast to the English *-s* added to the other two titles]

The appropriate English equivalent, 'The Fallen Woman', to convey the true meaning of *La Traviata* would have added to the scandal. Violetta describes herself once as 'fallen': 'la misera ch'è un dì caduta', and in a later scene she prays to God: 'Ah, della traviata sorridi al desio' ('smile upon the wish of the one gone astray').

[9] My correspondent's knowledge of English relieves me of any need to study Dutch. In so many international contacts the burden of communication is unequal, falling mainly upon the speaker of the language with narrower currency or less prestige.

[10] From *celeuma*, the Latinization of *κέλευμα* (a boatswain's call to the rowers). A conceivable alternative would be to take *Saloma* for a Latinization of *Σαλώμη*, who according to one Gospel (Mark 15:40, 16:1) was among the witnesses of the crucifixion and afterwards brought spices to the tomb of Jesus for the purpose of anointing him. But there is (to my knowledge) no evidence of this or any other woman's name in *-η* from the New Testament being Latinized to *-a*; she is *Salome* in the Vulgate and *Salomé* in Spanish Bibles.

[11] To do this, rather than giving their town some English name to replace *San Francisco*, they needed a bare minimum of effective bilingual contact. The Spanish toponym had already become established in the vocabulary of Anglophone seafarers, who made it a port of call even if they spoke little or no Spanish; and through them many other Anglophones had heard of San Francisco. It was also on numerous maps. So it held on after the annexation of California, for lack of any overriding motive to drop the preexisting Spanish name.

[12] 'An animal that breathes both by lungs and by gills…' (OED).

[13] *χίμαιϱα* was the ordinary Greek word for 'winterling goat'. If the glossator was right, the little-known onomapoetic *βήκη* captured the sound of the young animal, as distinct from an older one.

[14] Sooner or later some other expression was liable to arise that could fill this remarkable semantic gap. In the twentieth century *the fall guy*, which began in the slang of criminals, has caught on widely on the colloquial level.

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❧

THE ROLE OF EXPLICIT MEMORY IN SUPPORTING THE BILINGUAL LEXICON

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NEUROFUNCTIONALLY DISSOCIABLE IMPLICIT and explicit memory systems play distinct but complementary roles in first language representation, with morphological/syntactic rules supported largely by implicit, procedural memory, and the lexical-semantic component by explicit, declarative memory. This modularity of linguistic competence can be observed in aphasics, who may lose the procedural morpho-syntactic component of their primary language while preserving the declarative, lexical-semantic component (Wernicke's aphasia), or may show complementary deficits (Broca's aphasia). Theoretically, however, the morpho-syntactic component of a secondary language may be primarily supported by explicit, rather than implicit systems, if the L2 morpho-syntax has been learnt in an explicit manner. Evidence from brain-imaging studies of bilinguals and from unusual patterns of recovery in bilingual aphasics suggest that secondary languages studied in a formal, scholastic setting show greater dependence than the L1 on explicit memory systems.

1. EXPLICIT/IMPLICIT MEMORY. Explicit knowledge is information that is consciously learnt and consciously used. It is our encyclopedic knowledge of the world—our memories of facts and events (Squire & Zola-Morgan 1991). All knowledge that can be verbally expressed is declarative and explicit. In contrast, implicit competence refers to information that is acquired incidentally, is stored in such a way that it is opaque to introspection, is task-specific, and is used automatically (Paradis 1994). The abilities of implicit memory include the acquisition of skills and habits, non-associative learning, priming, and simple classical conditioning (Squire et al. 1991). Walking and bike-riding are examples of implicit, procedural skills, because they are skills performed automatically; they cannot be didactically taught; and they are acquired only through practice over time. Moreover, access to explicit knowledge is implicit, since the workings of our conscious minds are not consciously controlled.

2. NEUROFUNCTIONAL REPRESENTATIONS OF EXPLICIT AND IMPLICIT MEMORY. The neurofunctional model that I will use in this paper to describe explicit and implicit memory systems is the Damasian conceptual feature/Hebbian cell assembly model of the brain. According to this model, long-term memories are represented in the neo-cortex in the form of networks of locally connected neurons. Individual neurons within the networks are located in areas of the primary and early association

cortices that specialize in storing and processing specific types of information: auditory, visual, olfactory, motor, and sensory. The substrate for the convergence of these cells is maintained by the tertiary neo-cortices, as well as by certain structures of the medial-temporal lobes (including the hippocampus, the parahippocampal cortex, the entorhinal and perirhinal cortex), the frontal lobes, and the basal ganglia and cerebellum (Damasio 1989a, 1989b).

The medial-temporal lobes are indispensably involved in the consolidation of long-term explicit memories in the neo-cortex, since selective damage to the MTL results in anterograde and partial retrograde amnesia—an inability to acquire or recall conscious memories. (Zola-Morgan & Squire 1990, Alvarez & Squire 1994, Graham & Hodges 1997). In contrast, implicit memory processes are subserved by the ventro-lateral frontal cortex, basal ganglia and cerebellum. Selective lesion to the region of the frontal cortex known as Broca's area will impair implicit access to linguistic representations, and lesion to the basal ganglia or to the cerebellum will impair use of procedural abilities, such as motor and timing skills (Willingham, Koroshetz, & Peterson 1996, Harrington, Haaland, & Hermanowicz 1998). Furthermore, selective damage to the neo-cortex will destroy the representations of conceptual features which, bound together, constitute memories, thereby rendering these memories inaccessible by either explicit or implicit means.

Evidence for a double dissociation between implicit and explicit memory systems largely consists of studies of brain-damaged patients who show selective deficits for explicit memory, but not implicit memory, and of studies of patients who show the opposite phenomenon. Alzheimer's Disease, in the early stages of its usual form, damages the posterior neo-cortex and medial temporal lobes but spares the frontal cortex and basal ganglia. AD has as its symptoms anomia/word-finding difficulties, and anterograde and retrograde amnesia. Since lesion of the MTL does not affect the ability to acquire new, implicit motor skills and habits (Milner, Corkin & Teuber 1968), AD leaves implicit motor and perceptual skills relatively intact. Parkinson's Disease and Huntington's Disease produce symptoms complementary to those of Alzheimer's, since PD and HD disrupt the proper functioning of the basal ganglia (thereby affecting implicit memory), and leave explicit memory systems comparatively undisturbed (Ullman et al. 1997).

3. NEUROFUNCTIONAL REPRESENTATIONS OF LH LINGUISTIC COMPETENCE. Following a Hebbian/Damasian model, the phonological, morphological, syntactic and lexical-semantic information that a word comprises is stored as networks of conceptual fragments. Conceptual fragments are distributed throughout the brain in sensory-modality specific networks and are mapped to lexical items. Each set of features is unique to its lexical item, although any one feature may be shared among the conceptual networks of many different lexical items. Lexical items are part of linguistic competence. Conceptual features are independent of linguistic competence, but the manner in which conceptual features are mapped to linguistic items is language specific and is considered to be part of linguistic competence (c.f. Lamb, 1970).

4. DISSOCIABLE MEMORY SYSTEMS AND MODULARITY OF LINGUISTIC COMPETENCE. Lexical items are stored in the temporal-parietal neocortex of the Left Hemisphere, in the general area of Heschl's gyrus (the primary auditory cortex) (Caplan 1987, 1992). Because lexical-semantic information is acquired and used consciously (in the sense that people are overtly aware of the meanings of the words that they use), and because damage to the MTL prevents the learning of new lexical items, lexical-semantic knowledge is considered largely explicit. Conversely, grammatical competence (the phonological, morphological, and syntactic components of linguistic competence) is implicit. Among native speakers of a language the use of the rules that organize phonemes and morphemes into grammatical utterances is automatic, and the precise forms of these rules are impenetrable to conscious analysis. Implicit linguistic competence is subserved in the Left Hemisphere by the ventro-lateral frontal cortex (Broca's area), the basal ganglia, and the cerebellum (which are structures involved in the temporal, sequential organization of information), and is not disrupted by damage to the MTL or temporal-parietal cortex (Wernicke's area) (ibid).

In a 1997 study Ullman et al. exploited the linguistic aspect of the double dissociation between explicit/implicit memory systems to show that patients with explicit memory impairment and patients with implicit memory impairment demonstrated complementary deficits on a test that required setting English regular and irregular verbs in the past tense. Ullman et al. theorized that patients with explicit memory deficits would be impaired at the declarative, conscious component of language, which is the recall of arbitrary word-forms with high lexical-semantic content. Conversely, subjects with implicit memory deficits should have difficulty applying the procedural, rule-based component part of language, such as the ability to productively use morpho-phonological rules.

Ullman et al.'s study involved three sets of subjects: the first group consisted of Alzheimer's patients with explicit but not implicit memory deficits, and the second and third groups consisted of Parkinson's patients and Huntington's patients, all of whom demonstrated implicit but not explicit memory deficits. Subjects were given a sentence containing a regular, an irregular, or a novel verb, and were asked to set the sentence in the past tense. The results showed that Alzheimer's patients had more difficulty recalling the arbitrary past tense form of irregular verbs (for example, they produced overregularizations: *digged* rather than *dug*) than they did correctly applying the past tense *-ed* morpheme to regular and nonce verbs. In contrast, the Parkinson's and Huntington's patients were impaired at inflecting regular and novel verbs with the past tense *-ed* marker. The Parkinson's patients presumably did not add the past tense morpheme, while the Huntington's patients sometimes overapplied it, producing forms such as *lookeded*. (This qualitative difference in the misapplication of the morpheme correlates with the difference in the symptoms of the two diseases, since Parkinson's Disease leads to the suppression of frontal area/implicit activity, and Huntington's Disease leads to excitation of frontal area activity). The Parkinson's and Huntington's patients had comparatively few problems producing past tense forms of irregular verbs, although the Huntington's patients tended to overapply the past tense marker on irregulars.

5. EXPLICIT/IMPLICIT REPRESENTATION OF LEXICAL ITEMS. In terms of memory systems, Ullman et al.'s study describe a lexical item whose procedural, phonological, morphological, and syntactic components are subserved by implicit memory neurofunctional substrates, and whose declarative lexical-semantic component is subserved by explicit memory neurofunctional systems. Because the past tense *-ed* marker is a productive inflectional morpheme with little lexical-semantic content it is more dependent on implicit memory than an unproductive, memorized past tense form *dug* (< *dig*). In contrast, nouns and verbs (arbitrary word forms with high lexical-semantic content) are more dependent on explicit systems than are inflectional and derivational morphemes.

However, this model of differential implicit/explicit support of different lexical components cannot necessarily be extended to describe second language lexical items. First language morpho-syntactic procedural rules are acquired unconsciously and implicitly, but the same is not necessarily true of second language morpho-syntax rules. It is reasonable to assume that L2 morpho-syntax is not supported by implicit memory structures to the same extent that L1 morpho-syntax is, if second language learning occurs under conditions environmentally and ontogenetically different from L1 acquisition. Baring extraordinary circumstances, all people begin to acquire their L1 in babyhood. An L2 learner, however, may begin to study his second language at any age, under a variety of conditions, using any number of learning methods. As a result, although L1 morpho-syntactic competence is derived incidentally from practice and exposure, knowledge of an L2 morpho-syntax is often conscious and meta-linguistic, especially if the L2 has been learnt under formal conditions (i.e. at school), by relying heavily on rote-memorization, or through reading and writing (Paradis 1998). It may be theorized (Paradis 1994, 1997) that a second language learnt formally may be *less* dependent than a first language on implicit memory structures, and *more* dependent on explicit memory structures.

Evidence for this theory can be developed from brain imaging studies by Perani et al. (1996) and Dehaene et al. (1997). These two groups found activations in explicit memory substrates during second language tasks that were not recorded during first language tasks.

Perani et al. (1996) investigated language processing in bilinguals who spoke Italian as a first language, and who had had at least 5 years of English instruction in school after the age of 7 years. The subjects' task while being scanned was to listen to short, tape-recorded stories read in Italian, English, Japanese (a language of which the subjects had no knowledge), and to the Japanese tapes played backwards. When listening to the English stories subjects showed bilateral activation of the parahippocampal gyri that was not observed during the L1 condition. Perani et al.

attributed the activation of this region to 'an increased participation of memory-related structures'.

In a methodologically similar study by Dehaene et al. of French/English bilinguals, several subjects showed activation of the anterior cingulate gyrus during the second language condition, but not during the first language condition. The anterior cingulate is thought to be involved in conscious, controlled processing. Dehaene et al. suggested that the reason for its activation was the subjects' need 'to engage greater attentional resources for processing L2 than for the more automaticized processing of their maternal language'. As in Perani et al.'s 1996 study, the subjects were late bilinguals who had learned their second language (English) at school.

6. RECOVERY PATTERNS OF BILINGUAL APHASICS. Clinical evidence for primary support of second languages by explicit memory systems can be found in studies of bilingual aphasic recovery patterns. Generally after insult bilinguals regain both languages to the same extent and at the same time. However, cases in the literature exist of bilinguals who have recovered their languages successively, such that one language appeared only after the other had been regained. These instances of differential/successive recovery have been examined and re-examined over the length of this century in the hope of inferring a rule to successfully predict all possible patterns of bilingual aphasic recovery, a task that has been complicated by the fact that the earliest, often best-known reports on differential recovery frequently omit such relevant information as site of lesion. Most of the cases reported involve the post-morbid recovery of a commonly used language over a secondary language, a fact from which the French physician A. Pitres (1895) developed the following theory: The most familiar language is preferentially recovered after insult.

Pitres's 'rule' notwithstanding, instances have been recorded of bilingual aphasics recovering secondary, formally learnt languages before regaining primary, more familiar languages. In a 1965 paper M. Minkowski lists several examples of bilingual aphasics preferentially recovering secondary languages. Among them are the case of a 45-year-old Broca's aphasic who recovered his Standard German three months before Schweizerdeutsch, his most familiar language; the case of a 35-year-old polyglot who recovered her fourth language, Italian, before her first language, Schweizerdeutsch, after bilateral frontal lobe injury; and also the case of a 44-year-old Broca's aphasic who recovered his most familiar language, Schweizerdeutsch, only after regaining both his (explicitly learnt) second languages, French and German. All three aphasics convalesced in Swiss environments.

After closely examining the various circumstances under which the second language had been learned, Minkowski concluded that the unifying thread in all cases of preferential second language recovery was that the secondary language had special emotional significance for the patient. He argued that the affective force of the language for the patient was the reason for its preferential recovery. (An obvious difficulty for this theory is that there is no objective way of measuring a language's 'affective force' for a particular speaker). Minkowski, in fact, provides a secondary explanation of L2 preferential recovery that is compatible with an explicit memory systems model of L2 representation. For example, in the case of the 44-year-old Broca's aphasic who regained his French and German before his more commonly-used Swiss dialect, Minkowski builds a reasonably convincing argument that the patient had a special emotional attachment to the French language. However, he attributes the patient's preferential recovery of Standard German to the fact that the patient had been taught to read and write in German rather than Schweizerdeutsch. Minkowski believed that the 'kinesthetic and visual elements related to reading and writing' created a cerebral representation of Standard German that was less 'fragile' than that of the patient's Swiss dialect, and therefore less affected by cerebral injury.

An explicit/implicit memory systems model offers another explanation for some cases of preferential secondary language recovery. As Paradis has suggested, one of the factors affecting bilingual recovery patterns may be the extent to which the L2 was consciously learned. Re-examination of Minkowski's case studies, paying particular attention to lesion site, provides support for Paradis's theory. Because all three cases mentioned above involve damage to the frontal lobes, which subserve implicit linguistic competence, impairment to the primary, implicitly acquired language is expected. Because the secondary languages preferentially recovered had been studied in school, under formal conditions, which involved the largely explicit memory-dependent functions of reading and writing, these languages were mainly supported by explicit memory systems and were therefore less affected than the primary languages by injury to implicit frontal lobe systems.

7. CONCLUSION. Although identical neuroanatomical structures may subserve both languages in bilinguals, these structures do not necessarily subserve all components of both languages to the same extent. Explicit memory systems support the lexical-semantic components of both primary and secondary languages, however, as Paradis (1994) has proposed, secondary language morpho-syntax, and therefore secondary languages in their entireties, may be more dependent on these structures than are primary languages. The review in this paper of recent neuroimaging studies by Perani et al. (1996) and Dehaene et al. (1997) demonstrates that their data provides evidence consonant with Paradis's theory. Paradis has also suggested that some cases of preferential recovery of L2 in aphasics may be explicable in terms of greater L2 dependency on explicit substrates. This paper has re-examined classic bilingual aphasic studies in light of this theory in an attempt to correlate site of lesion with deficit, and a link has been shown to exist between damage to frontal structures subserving implicit functions, and sparing of an explicitly learned L2. Further examination of the operations of the explicit and implicit memory systems, particularly the manner in which these systems consolidate memories over time, should help to create a more precise model of second language representation.

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DIFFERENTIAL LOCALIZATION OF L1 AND L2 WORDS IN THE BILINGUAL BRAIN: A METATHEORETIC STUDY

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It has long been established that certain areas of the brain subserve language functions. In the vast majority of right-handed individuals, these areas include portions of the left hemisphere surrounding the Sylvian fissure, particularly the posterior inferior frontal lobe and the posterior temporal lobe. In the case of bilinguals, the question which naturally arises is that of how separate languages are anatomically stored in the brain. There are 3 basic hypotheses: 1) L1 and L2 are represented in the same cortical substrates; 2) L1 and L2 are represented in distinct cortical areas; and 3) L1 and L2 are represented in different but overlapping areas[1]. Any attempt to answer this question should address two separate but related issues: 1) How are words in different languages represented in the bilingual brain?; and 2) How are the implicit grammatical rules underlying linguistic competence represented in the bilingual brain? This paper will address the first of these issues, namely the cortical representation of *words* in the bilingual brain.

1. HYPOTHESIS I: SAME CORTICAL SUBSTRATES.

1.1. EVIDENCE FROM PET. The first hypothesis, *i.e.*, that L1 and L2 words are represented in the same cortical substrates, receives experimental support from studies using Positron Emission Tomography (PET). Klein et al. (1994) looked at 12 right-handed unimpaired subjects (6 male and 6 female) who had learned their L2 after age 5. Testing was done in English (L1) and French (L2 in which the subjects were considered proficient). Two tasks were performed. The first was a repetition task in which 22 common words were presented auditorily in each language and subjects were asked to repeat the words aloud. The second was a translation task in which common words were presented auditorily in each language and subjects were asked to translate them. In the repetition task, results revealed a strikingly similar pattern of cerebral blood flow (CBF) for L1 and L2. The only significant difference found was a change in CBF near the left putamen during repetition in L2. In the translation task, the CBF pattern was again found to be strikingly similar for L1 and L2. The authors further observed activity in the left putamen when subjects translated from L1 to L2 but *not* from L2 to L1. From these results, the authors concluded that repetition in L1 and L2 makes demands on almost completely overlapping neural substrates, but that L2 requires *additional* neural processes. They further concluded that the left putamen is involved in L2 production but not comprehension without production. Activation of the left putamen was hypothesized to be a function of the increased articulatory demands imposed by speaking a language learned later in life.

In 1995, Klein et al. conducted a second study testing the same types of subjects and languages but using different tasks. In each task, subjects were presented auditorily with a stimulus word. Depending on the task, the subjects were then asked to produce: (1) a synonym; (2) a word which rhymed with the stimulus word; or (3) a translation equivalent. Results showed that, with the exception of the left putamen being activated during word production in L2, activation patterns were almost identical for L1 and L2. Regardless of the task or language, there was significant overlap in activation in the frontal language area (left inferior frontal and immediately adjacent posterior dorsolateral cortex, left parietal and inferotemporal regions). They concluded that there was no evidence to support the hypothesis that an L2 acquired later in life (after age 5) is represented differently from the L1. They further concluded that there are no significant differences in the neural substrates that subserve within- and across-language searches.

1.2. EVIDENCE FROM fMRI. The first hypothesis also receives support from studies using functional Magnetic Resonance Imaging (fMRI). Yetkin et al. (1996) looked at 5 right-handed unimpaired trilingual males who were fluent in an L2 but also knew a third language (L3) in which they were *not* fluent. In the latter case, subjects had studied their L3 for 2 to 4 years but did not regularly converse in it. The languages tested varied across subjects, but each subject was tested in 3 languages: English (which was also the mother tongue of 3 of the subjects), a second language (which was the mother tongue of the 2 remaining subjects) and a third language. The task to be performed was a word generation task in which subjects were cued with a randomly selected letter of the given language and were asked to internally generate words beginning with that letter. Most of the activation observed was in the inferior frontal, middle frontal and precentral gyri. For all subjects, the number of activated pixels was greatest for the language in which they were *least* fluent (L3:59%, then L1:25%, then L2:16%). No significant differences were found between L1, L2 and L3 with respect to *location* of activation. The authors did find some differences with respect to which areas were *more* active, depending on the language, but not with respect to which areas *were* active. For instance, they found that for L1 and L2, there was greater activity in the frontal area, followed by the parietal area and then the frontoparietal area, whereas for L3 the frontoparietal area was more active than the parietal area (the frontal area remaining the most active of the three). They concluded that word generation involves the same neural substrates for L1, L2 and L3. They further concluded that, in multilinguals, languages in which the person is not fluent demands greater brain activity than those in which s/he is fluent.

Chee et al. (1999) investigated the role of age of acquisition in the cortical representation of words. They looked at 24 right-handed unimpaired fluent bilinguals, 15 of whom were 'early' bilinguals (*i.e.*, exposed to both languages prior to age 6) and 9 of whom were 'late' bilinguals (*i.e.*, exposed to English after age 12). Subjects were tested in English and Chinese (Mandarin). Two word completion tasks were used. In the first, a word stem (in the case of English) or half a compound (Chinese) were presented visually and subjects were asked to 1) complete the word stem (if English) or complete the compound (if Chinese); and 2) complete the same from the right. Results indicated that the patterns of activation were strikingly similar for English and Mandarin for both early and late bilingual subjects. Activation was observed in the prefrontal region involving the rostral middle and inferior frontal gyri (Ba 44/45, 46/9), supplementary motor area, bilateral occipital and bilateral parietal regions (Ba 7). Posterior temporal activations were also observed in some subjects. The location of peak activations in both languages within the left prefrontal region coincided completely in 20/24 subjects (and were less than 4.5 mm apart in the remaining 4). No significant differences were found with respect to the extent of activation for either age of exposure or language. From these results, the authors concluded that the same cortical areas are involved in word generation in L1 and L2. They further concluded that there was no evidence to suggest a change in cerebral plasticity for language with age in terms of *where* word processing occurs.

2. HYPOTHESIS II: DISTINCT CORTICAL AREAS

2.1. EVIDENCE FROM SODIUM AMYTAL TESTING. The second hypothesis, *i.e.*, that L1 and L2 words are represented in distinct cortical areas, appears to receive experimental support from Sodium Amytal testing. Berthier et al. (1990) tested a 25 year-old right-handed male with a right mesial basotemporal arteriovenous malformation (AVM). He was tested in Spanish (L1) and English (L2). Abilities tested included repetition (simple common words), comprehension (as measured by the ability to follow simple commands and answer simple questions), naming (common objects), and counting (1–10). Two minutes and 48 seconds following the sodium amytal injection, the patient began responding in his L2 (English) only. He only recovered Spanish (his L1) 52 seconds later. From these results the authors concluded that L2 is located in the central core of the Sylvian fissure, whereas L1 is located in the more distal Perisylvian regions. The rationale behind this was that since the sodium amytal enters the Middle Cerebral Artery (MCA) bed in the Sylvian fissure first and then moves outward to the distal branches of the MCA, the central core of MCA in the Sylvian fissure should become clear of the sodium amytal before the distal branches. Hence, function should first return to the cortex that immediately surrounds the fissure of Sylvius, rather than the cortex of the distal area (Whitaker 1983). This suggests that in the case of this patient, English (L2) was represented in the central Sylvian core of the left hemisphere, whereas Spanish (L1) was represented in the more distal perisylvian regions[2].

Rapport, Tan and Whitaker (1983) tested 4 right-handed patients aged between 24 and 41 (3 male, 1 female) with various tumours and AVMs.[3]. Patient 1 was tested in Cantonese (L1) and English (L2). Patients 2 and 4 were tested in Hokkien (L1), English (L2) and Mandarin (L2). Patient 3 was tested in Hokkien (L1), English (L2) and Cantonese (L2). The task at hand was a naming task adapted from Ojemann and Whitaker's (1978) study. Following the injection, Patient 1 recovered his L2 (English) before his L1 (Cantonese). Patients 2 and 3 recovered one of their L2s (English) before their L1 (Hokkien), followed by another L2 (Mandarin and Cantonese respectively). As for Patient 4, English (L2) was better preserved than Hokkien (L1) and Mandarin (L2). The generalization to be drawn was that in all four cases, an L2 was either recovered first or better preserved than the L1. Furthermore, no correlation was found between order of recovery and self-reported fluency.

3. HYPOTHESIS III: DIFFERENT BUT OVERLAPPING AREAS

3.1. EVIDENCE FROM ELECTROCORTICAL STIMULATION. The third hypothesis, *i.e.*, that L1 and L2 words are represented in different but overlapping areas, appears to receive support from electrocortical stimulation studies. Ojemann and Whitaker (1978) performed this technique on two epileptic patients. The first was a 37 year-old right-handed male with a left temporal epileptic focus. The second was a 20 year-old left-handed female with a right temporal epileptic focus. The former was tested in Dutch (L1) and English (L2), and the latter in English (L1) and Spanish (L2). A visual naming task was used in which achromatic slides with line drawings of common objects were presented. Results indicated that for both patients, there were areas where both languages were equally sensitive to disruption by stimulation and areas with differential effects on the two languages. In the case of the first patient, of the 23 sites stimulated, 10 showed no statistically significant changes with either language, 6 showed disturbances on all samples in both languages, and 7 showed differential effects. Similar effects were observed with the second patient. In general, the patterns of organization of the 2 languages appeared to be similar for both patients. Within the centre of the language area for each patient, there appeared to be sites common to both languages. This is particularly striking in Case 1, where the sites adjacent to the Sylvian fissure both frontally and parietally were common to both Dutch and English. In Case 2, this was the case in the posterior temporal lobe. Peripheral to these 'central' areas, in both anterior and posterior language areas in both cases, there were sites with differential organization of the two languages. The authors further observed that each patient's L2 seemed to be represented in a wider area of cortex than his/her L1. As a possible explanation, they suggested that during language acquisition, initially a large number of neurons located over a wide area of cortex is needed for naming in that language, and that as proficiency in that language increases, the number of neurons or the area of cortex needed for naming may shrink.

Rapport, Tan and Whitaker (1983) also performed electrocortical stimulation on 3 right-handed male patients with left-hemisphere lesions[4]. Patients 1 and 5 were tested in Cantonese (L1) and English (L2), whereas Patient 2 was tested in English (L2) and Mandarin (L2). The first task was an object naming task adapted from Ojemann and Whitaker (1978). The second was a reading task in which a single word or ideogram was presented on a colour slide with 3 photographs, one of which corresponded to the word or ideogram. Subjects were asked to point to the right photograph. Results suggested that there were cortical sites at which both languages were (more or less) equally disrupted and sites where only one of the subjects's languages was disrupted. In the case of Patient 1, there were sites around the posterior Sylvian fissure where naming was significantly disrupted in English (L2 and dominant language), but not in Cantonese (L1). Naming in Cantonese was disrupted at scattered sites which were more remote. With Patient 2, disruption in naming in Mandarin (L2 and dominant language) also tended to occur at sites which clustered around the posterior Sylvian fissure. Naming in English (L2 but not dominant language) was more likely to be disrupted at peripheral sites. They also found that stimulation did not interfere with this patient's ability to read at any site in either language. With Patient 5, again errors in naming in English (L2 and dominant language) seemed to be more localized (superior temporal gyrus) whereas errors in Cantonese (L1) tended to occur at more scattered sites. Only 2 sites produced errors in both languages. From these results, the authors concluded that a bilingual's dominant language is represented in the centre of the language areas, whereas their other (non-dominant) languages are represented in more peripheral sites.

4. INTERPRETING THE EVIDENCE.

4.1. ELECTROCORTICAL STIMULATION STUDIES. The results of electrocortical stimulation studies are problematic for several reasons. First, the patterns of disruption observed differ from one study to the next. For instance, Ojemann and Whitaker's (1978) study suggests that the 'core' language areas are common to both L1 and L2 words, while the more peripheral areas contain sites for L1 words or L2 words (but not both). Rapport, Tan and Whitaker's (1983) study, on the other hand, suggests that the 'core' language areas are primarily responsible for words in the bilingual's dominant language, while the more peripheral areas contain sites specific to the his/her other languages.

A second problem lies in the validity of the methodology itself. In these experiments, stimulation was carried out using bipolar electrodes placed 5 mm apart. As Paradis (1996) points out, the spreading which may occur at each end of the electrodes could interfere with an area of at least 20 square millimeters. Thus, we cannot be certain whether disruption is a consequence of stimulating the target site or an adjacent site.

Third, the subjects used in these studies are impaired. Ojemann and Whitaker's patients were epileptic. Seizure disorders may cause a reorganization of cortex related to language as a result of abnormal electrical discharges (Rapport, Tan and Whitaker 1983). Rapport, Tan and Whitaker's patients were all being treated for tumors or arteriovenous malformations. The first patient had a left tentorial meningioma, which often causes displacement of neural structures (Rogers 1996). The second patient had a left frontal astrocytoma, which may also cause displacement of neural structures (25% to 33% of the time) (Beaumont 1996).

Fourth, the inability to name objects in a given language at a particular site does not necessarily reflect the 'absence' of that language at that site. In fact, the lack of disruption in reading observed in Rapport, Tan and Whitaker's (1983) own study provides evidence to the contrary. The fact that reading was not disrupted at sites where naming was disrupted indicates that the words in question are actually 'there', but that the process of naming is disrupted. Furthermore, antagonistic recovery from aphasia provides further evidence against this idea that access equals representation. In antagonistic recovery, a patient will at first recover one language (call it language A) but not another (Language B). As time elapses, however, the patient may present with aphasic symptoms in Language A while recovering Language B (Paradis 1977). If a patient eventually recovers Language B, then it must have 'been there' during the first phase of the recovery as well, even though the patient did not appear to have access to it.

Finally, with respect to cortical localization of languages, either a language is 'there' or it isn't. As Paradis (1996) points out, at sites which allegedly subserve only one language, the responses to stimulation observed during the experiments in question were not 'all or nothing'. That is, it was not the case that Language A (the language subserved by a given site) was always disrupted by stimulation at that site but rather that it was disrupted *most* of the time. If disruption in naming is indicative of the presence of a language at a given site, then we would be hard pressed to explain why the language was there during some of the trials but not during others (Paradis 1996).

4.2. SODIUM AMYTAL STUDIES. The results obtained from Wada tests are also problematic. Recall that the rationale behind the use of this test is that order of recovery should give us an indication of which language is stored in which area. However, it is important to clarify what exactly is meant by 'order of recovery'. Order of recovery should entail that one language is recovered *prior to* another. However, this is not always the case in studies using Wada testing. What often occurs is that one language is *better* recovered than another. For instance, consider the first patient in Rapport, Tan and Whitaker's (1983) study. It is not the case that naming was undisturbed in English and disrupted in Cantonese, but rather that naming was *less* disturbed in English than it was in Cantonese (14/18 correct responses in English vs. 5/18 in Cantonese). Thus, we are actually dealing with *degree* of recovery rather than *order*. Even in cases where one language *is* recovered prior to another following the injection, such an observation does not necessarily tell us anything about the location of the language. As mentioned previously, antagonistic recovery from aphasia suggests that while a language may not be accessible at a given time, its representations may nevertheless remain intact and become accessible at a later time. The observation that one language is recovered prior to another during a Wada test can just as easily be accounted for by the Activation Threshold Hypothesis (Paradis 1996). This hypothesis holds that different languages may have different activation thresholds, *i.e.*, may require different degrees of stimulation to become accessible (depending, for example, on factors such as frequency of use or time elapsed since it was last used). In the case of Wada tests then, one language may become accessible first because its activation threshold is lower. Note that this hypothesis can not only account for differential order of recovery following sodium amytal injection, but can also explain antagonistic recovery from aphasia. The accessibility (or inaccessibility) of a language would reflect a lowered (or raised) activation threshold for that language at that time.

5. CONCLUSION. We have seen that cortical stimulation is not an appropriate measure of cortical localization of languages for several reasons. Hence, results of these studies cannot be used either in favour of or against differential localization of languages in the bilingual brain. Thus, Hypothesis III, namely that L1 and L2 words are represented in distinct but overlapping neural substates, remains unsupported. Similarily, sodium amytal testing was also shown not to be an appropriate measure of cortical localization of languages. Thus, Hypothesis I, namely that L1 and L2 words are represented in distinct cortical areas, remains unsupported. There is therefore insufficient evidence to reject the null hypothesis: L1 and L2 words are represented in the same cortical areas. PET and fMRI studies support this hypothesis in spite of potential factors such as degree of proficiency (*e.g.*, Yetkin et al. 1996) and age of L2 acquisition (Klein et al. 1994, 1995, and Chee *et al.* 1999).

Future research must focus on ensuring better control of variables which have not been taken into consideration in past studies and which may prove relevant to potential differences in L1 and L2 processing (*e.g.*, manner of L2 acquisition). Studies should also be replicated and the results compared in order to ensure that the results observed are indeed generalizable rather than study-specific. The same tasks should also be used across studies to ensure that the same processes are involved. Finally, a comparison of results for structurally different languages should also be undertaken in order to ensure that results are not language-specific.

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[1] Unless otherwise stated, L1 will be used to refer to the mother tongue, while L2 will refer to any secondary language.

[2] Pulvermüller and Schumann (1994) offer a different interpretation of Berthier et al.'s findings. Specifically, they claim that since sodium amytal first affects the perisylvian core and then moves towards the peripheral areas, and since L1 is affected (*i.e.*, not used) during the first of these phases, the perisylvian core is most essential for the first language (see also Zatorre (1989) for a similar view; see Paradis (1995) for a discussion of Pulvermüller and Schumann's interpretation).

[3] Patient 1 had a left tentorial meningioma (posterior, inferior left temporal lobe), Patient 2, a left frontal astrocytoma (middle and inferior frontal convolutions), Patient 3, a right temporal epileptic focus, and Patient 4, an aneurysm of the frontopolar branch of the right anterior cerebral artery.

[4] Patient 5 had an AVM in the left middle cerebral artery. Patients 1 and 2 were described in endnote 3.

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AN INTERLINGUAL PRIMING TASK FOR ENGLISH-GERMAN BILINGUALS

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Bilingualism is a phenomenon[1] of growing importance at the beginning of the 21st century as more and more aspects of everyday life are subject to internationalization. With an estimated 4,000 languages existing in the world there is an ever increasing chance for people to be exposed to more than just one language, i.e. bilingualism or even multilingualism are spreading (cf. Valdés 1998). In the field of linguistics, bilingualism has been studied for almost fifty years. Weinreich (1953) suggests three possible forms of organization for linguistic concepts in a bilingual's mind: (1) *compound* organization, meaning that the bilingual has one concept in his mind for both languages he speaks; (2) *co-ordinate* organization, meaning there is one concept available for each of the respective languages; (3) *subordinative* organization, which is somewhat different from the previous two forms of organization in that it mainly serves to describe the linguistic competence of bilinguals who are not very proficient in their second language (cf. de Groot 1993:27–28). In 1954 Ervin and Osgood elaborated on the differences between (1) and (2) and what they called the 'compound-coordinate dichotomy' (cf. Archibald & Libben 1995:420–421). One should keep in mind, however, that bilingualism cannot simply be seen as a phenomenon with clearly cut boundaries because a person's bilingualism can manifests itself on different levels of proficiency relative to other bilinguals or even monolinguals (cf. Grosjean 1982).

Over the years, research on bilinguals has continued to expand, and different models have been proposed to deal with conceptualization in bilinguals' minds. Potter et al. (1984) suggested that bilinguals use concept mediation as opposed to word association when naming or translating in both languages. 'According to the concept mediation model, the bilingual's second language is associated directly with the relevant underlying concept and thus is only indirectly associated with the first-language word', Potter et al. point out (1984:24). On the other hand, the word association model states that the 'access to and from the second-language word (L2) is exclusively via the first-language word (L1)' (Potter et al. 1984:24). In other words, concept mediation follows Weinreich's idea of compound organization, whereas word association lends itself more to the proposal of co-ordinate organization. Schwanenflugel and Rey (1986) and Dufour and Kroll (1995) corroborated general support for the concept mediation model.

The following study introduces a new experimental paradigm designed to investigate the access of translation equivalents by English-German bilinguals: it looks at the role of concepts that may or may not provide a common link between translation equivalents (compound vs. co-ordinate organization) and the role of L1 and L2 (interlingual vs. intralingual processing). In order to achieve this, various combinations of experimental items were generated and presented to participants in the form of triplets such as *Dampf* (Ger. 'steam') – *heat* – *steam*. The second word of the triplet (here *heat*) was thought to be capable of serving as a concept due to the fact that it did not represent a direct link between the translation equivalents (here *Dampf* and *steam*) but instead an indirect one based on membership in the same semantic field (here *hot temperature*).

The present study tries to shed light on the role of concepts in bilingual processing because these constitute an important part of the notion of compound organization embraced by Weinreich and Potter et al. In what way, if at all, does manipulating a concept influence the access of translation equivalents? The main research question is whether priming with the help of a concept facilitates the access of translation equivalents. This question can be broken down into a language component (intralingual vs. interlingual primes) and a meaning component (semantically related vs. semantically unrelated primes). Significant differences within the language component would support the co-ordinate view of bilingual organization, whereas a lack of significant differences would enhance the notion of compound organization. As for the meaning component, the existence or lack of differences should be of no concern to co-ordinate organization because L1 and L2 are considered to be different systems. Potential differences, however, would be interesting from the point of view of compound organization as they would highlight the role of concepts.

Language and *meaning* have already been identified as relevant *general* factors that may have a potential of influencing bilingual mental processing and thus concepts. It would be by far more intriguing, however, to uncover *specific* details of those two factors and possible interactions with the main question being always whether a specific language-meaning combination would yield statistically significant results. The design of the experiment allowed for quite a number of different experimental conditions. As for simple language or meaning effects, conditions included: (a) exposing subjects to mixed-language sequences such as *Dampf* (Ger. 'steam') – *heat* – steam (German-English) as opposed to same-language sequences such as *Dampf* – *Hitze* (Ger. 'heat') – steam (German-German); (b) exposing subjects to semantically mixed sequences such as *Dampf* – *Rasen* (Ger. 'lawn') – steam as opposed to semantically coherent sequences such as *Dampf* – *Hitze* – steam. As for the interactions of *language* and *meaning*, the conditions consisted of: (c) exposing subjects to *semantically coherent mixed-language sequences* such as *Dampf* – *heat* – *steam* as opposed to *semantically incoherent mixed-language sequences* such as *Dampf* – *lawn* – *steam*; and, finally, (d) exposing subjects to *semantically coherent same-language sequences* such as *Dampf* – *Hitze* – *steam* as opposed to *semantically incoherent same-language* sequences such as *Dampf* – *Rasen* – *steam*.

Factor	**Level**	**Example**
TE Prime	English onset word	*Steam*
	German onset word	*Dampf* 'steam'
SAL Prime	English	*Heat*
	German	*Rasen* 'lawn'
SAM Prime	Related	*Heat*
	Unrelated	*Lawn*

Table 1. Experimental design: Factors and levels (with examples). Above example illustrates sequences like *Dampf – heat – steam*, or *steam – lawn – Dampf*. Targets are not listed as they can be inferred from the translation equivalent primes. Lists have not been listed either (the levels are only '1' and '2').

The manipulation of language and meaning is made possible by the translation equivalent paradigm introduced in the present study. Using this paradigm, the study endeavors to shed more light on factors that may influence the processing of concepts in the bilingual mind.

1. EXPERIMENT.

1.1. PRELIMINARIES. The dependent variable of this experiment was the reaction time (RT) it took subjects to decide on the status of translation equivalents presented on a computer screen in the form of triplets. As already mentioned, subjects could encounter a variety of triplet combinations (cf. experimental conditions (a) to (d) above). The basic task, namely making a reasonably quick and accurate decision on the status of the members of the triplet, was always the same. It consisted of deciding whether the first and the last word in the triplet were actual translation equivalents or not. The independent variables were List, Translation Equivalent (TE) Prime, Semantic Associate (SA) Prime (with the levels Semantic Associate Language (SAL) and Semantic Associate Meaning (SAM))[2]. There were two different lists. TE Primes consisted either of an English or a German onset word (e.g., *steam* or *Dampf*). SAL Primes represented either an English or a German prime (e.g., *heat* or *Hitze* 'heat'). SAM Primes featured two levels, *related* and *unrelated*, i.e., if the TE Prime were *steam*, *heat* would be related and *lawn* unrelated. Subjects were nested within the two lists. Lists, TE Primes, SAL Primes, and SAM Primes were crossed, and a Word, constituting any possible combination of the crossed factors (e.g., *Dampf – heat – steam* from list 1), was nested within each of those. Lists, Words, and Subjects were treated as random factors, whereas the other variables were treated as fixed factors. A graphic representation of this experimental design is presented in Table 1 (and illustrative examples can be found in Table 2).

1.2. METHOD.

1.2.1. PARTICIPANTS. Eighteen undergraduate and graduate students of the University of Alberta participated as unpaid volunteers in this experiment (n = 18). Seven subjects were native speakers of English and seven participants had German as mother tongue. Both groups had advanced knowledge of the respective second language. One subject indicated both languages as mother tongue, and three subjects did not speak English or German as a mother tongue but reported to have an advanced command of both languages. Four participants were male and fourteen female.

1.2.2. STIMULUS MATERIALS. Stimulus materials for the actual experiment consisted of eight sets containing six triplets each (per list), which means that 144 items were employed in each list. Lists only differed in the distribution of the levels of SAM Primes. One set of four triplets (twelve items) was used in an obligatory pre-experiment practice trial. The triplets consisted of an English or German TE Prime (e.g., *steam* or *Dampf*), followed by an SA Prime (with levels SAM/SAL; e.g., *heat* or *Hitze*), and, finally, a German or English Target (e.g., *Dampf* or *steam*). There was an equal number of experimental targets and control targets, like for example *steam – lawn – Wurst* 'sausage' or *Wurst – Rasen* 'lawn' – *steam*. The correct translation judgement for these items was 'no'. Thus, the number of correct 'yes' and 'no' responses was balanced across the experiment. All lexical items used were simple monomorphemic words in both languages. Related SAM Primes displayed some semantic link to TE Primes in that they were members of the same semantic field (e.g., *Dampf – heat – steam*); unrelated SAM Primes, on the other hand, lacked such a connection (e.g., *Dampf – lawn – steam*). Items were controlled for length and content but not for frequency or typicality as sufficient frequency and typicality were assumed (the major difficulty being access to German frequency data).

1.2.3. PROCEDURE. Before the experiment, subjects were made familiar with the computer equipment, were informed of the nature of their task, and had to fill out a questionnaire on their linguistic background. The main point of the instruction was to tell participants they have to press specified 'yes' or 'no' keys on the keyboard, according to whether they thought TE Primes and Targets presented on the screen (e.g., *Dampf* and *steam*) were translation equivalents or not. Participants were encouraged to make their decision with reasonable speed and accuracy. Having received this background information, which was also presented on an instruction screen on the computer, subjects were randomly assigned to one of the two lists and completed a practice session. This was followed by the 48 trial main experiment in which the 144 experimental items were presented in random order. First, an asterisk (*) appeared on the screen for 250 ms and then vanished; it thus served as a fixation point. Then the TE Prime was shown in the same manner, followed by the SA Prime and, finally, the Target. With the latter appearing on the screen, the timing device was activated and measured the subject's RT. As soon as the subject pressed the appropriate button ('yes' or 'no'), time was stopped and the next triplet of experimental items appeared until the completion of the 48 trials. Table 2 indicates the sequence of experimental events schematically and with examples.

(1) and (2) illustrate the case when TE Prime and Target are equivalents; the SA prime is semantically related to both and differs only in the language (English vs.

ID	Fixation (250 ms) →	TE Prime (250 ms) →	SA Prime (250 ms) →	Target/Control (Until Response)
1	*	*Dampf* 'steam'	*Heat*	*Steam*
2	*	*Dampf*	*Hitze* 'heat'	*Steam*
3	*	*Dampf*	*Lawn*	*Steam*
4	*	*Dampf*	*Rasen* 'lawn'	*Steam*
5	*	*Steam*	*Heat*	*Dampf*
6	*	*Steam*	*Hitze*	*Dampf*
7	*	*Steam*	*Lawn*	*Dampf*
8	*	*Steam*	*Rasen*	*Dampf*
9	*	*Steam*	*Heat*	*Wurst* 'sausage'
10	*	*Steam*	*Hitze*	*Wurst*
11	*	*Steam*	*Lawn*	*Wurst*
12	*	*Steam*	*Rasen*	*Wurst*
13	*	*Dampf*	*Heat*	*Sausage*
14	*	*Dampf*	*Hitze*	*Sausage*
15	*	*Dampf*	*Lawn*	*Sausage*
16	*	*Dampf*	*Rasen*	*Sausage*

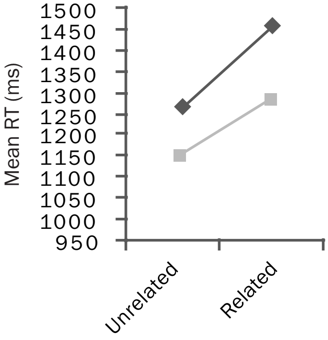
Table 2. Schematic and actual sequence of stimuli (illustrative). The ID column was not part of the experiment; it is used for illustrative purposes only. Shaded areas denote (a) SA Primes semantically unrelated to the TE Prime or (b) Controls. "→" indicates 'is followed by'. Each item displayed for 250 ms (with the exception of 'Target'). Timing device activated upon appearance of 'Target'.

German). (5) and (6) illustrate the case when English instead of German is used for the TE Prime. (3) and (4) show triplets where the SA Prime is not semantically related to the TE Prime (shaded area). (7) and (8) again show the use of English as TE Prime and semantically unrelated SA Primes (shaded area). (9) to (16) illustrate the use of control targets (shaded area).

The experiment was run on an Apple Power Macintosh 6100/60 desktop computer equipped with a millisecond clock. The presentation of the stimuli and the recording of RTs were controlled by the PsyScope 1.1 computer program. For the statistical analysis an Apple Power Macintosh 5400/180 computer was used and the DataDesk 6.0 PPC and StatView 4.02 computer programs.

1.3. RESULTS AND DISCUSSION. In order to make a basic assessment of any results possible, it had to be verified whether or not the experiment worked at all. If it did, control targets of the kind presented in Table 2 ((9) to (16)) should require longer RTs than experimental Targets ((1) to (8)). Indeed, a paired t-test revealed a statistically significant advantage of 228 ms of experimental targets over control targets ($p = 0.0025$) which means that the basic experimental design does work and allows one to examine interlingual activation.

Another important point is how possible outcomes of the experiment relate to the research questions outlined earlier. If, on the one hand, there should be a



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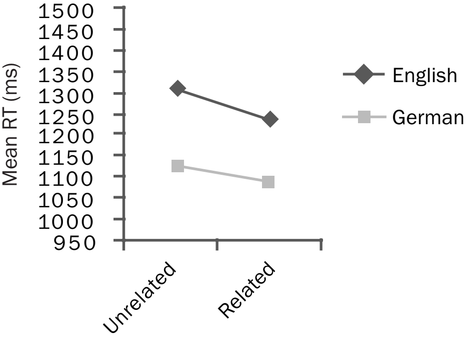

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Figure 1 (left). Actual mean RTs obtained for stimuli on the language level (SAL primes): Interlingual English and German condition.

Figure 2 (right). Actual mean RTs obtained for stimuli on the meaning level (SAM primes): Intralingual English vs. Intralingual German Conditions.

priming advantage for *intra*lingual primes over interlingual primes, one could expect sequences like *Dampf – heat – steam* where there is a change of language between the TE Prime and the SAL Prime (interlingual condition) to take longer to process than sequences like *Dampf – Hitze – steam* where there is no change of language between the TE Prime and the SAL Prime (intralingual condition). Such a result (cf. experimental condition (a) in the introdution) would in general support the co-ordinate organization of bilingual minds for the language level. Due to the nature of the co-ordinate proposal the meaning level is of no relevance here.

If, on the other hand, one subscribes to the proposal of compound organization, sequences like *Dampf – Rasen – steam* should take longer to process than sequences like *Dampf – Hitze – steam* because the former involves a SAM Prime that is semantically unrelated to the TE Prime whereas there is a semantic relationship between Dampf and Hitze in the latter (cf. experimental condition (b) in the introduction). The same should apply to sequences like *steam – Wurst – Dampf* (semantically unrelated) and *steam – Hitze – Dampf* (semantically related) because the change in language between the TE Prime and the SA Prime should not matter (cf. experimental conditions (c) and (d) in the introduction).

The importance of SAL Primes and SAM Primes has already been outlined above. Figures 1 and 2 illustrate the results for those two factors:

Figure 1 shows that both English and German SAL Primes yielded longer RTs for the *related* level than for the unrelated level. German yielded faster RTs than English on both levels. As an analysis of variance showed, these differences are not significant (F (1,1) = 0.70152, p = 0.5561); still they are somehow counter-intuitive. They do not support the assumption of co-ordinate bilingual organization. The data can,

TE Prime	SA Prime		Target	Mean RT (ms)	SD	ID
	SAL	SAM				
German	English	Related	English	1,280.056	604.972	1
	German	Related	English	1,082.778	363.917	2
	English	Unrelated	English	1,148.529	419.820	3
	German	Unrelated	English	1,118.222	391.612	4
English	English	Related	German	1,228.778	457.840	5
	German	Related	German	1,453.000	712.210	6
	English	Unrelated	German	1,301.722	415.776	7
	German	Unrelated	German	1,261.278	504.219	8

Table 3a.Mean RTs and SDs for the various experimental conditions.

TE Prime	SA Prime		Control	Mean RT (ms)	SD	ID
	SAL	SAM				
English	English	Related	German	1,550.167	497.893	9
	German	Related	German	1,549.667	557.950	10
	English	Unrelated	German	1,658.611	888.539	11
	German	Unrelated	German	1,380.833	416.605	12
German	English	Related	English	1,365.944	445.648	13
	German	Related	English	1,410.778	560.977	14
	English	Unrelated	English	1,488.222	513.020	15
	German	Unrelated	English	1,327.556	477.504	16

Table 3b. Mean RTs and SDs for the various control conditions (for comparative purposes).

however, be considered compatible with the assumptions of compound bilingual organization because they are statistically insignificant. Sample sequences for SAL Primes would include *steam – Rasen – Dampf* (Eng. – Ger. – Ger.) vs. *steam – lawn – Dampf* (Eng. – Eng. – Ger.), and *Dampf – Rasen – steam* (Ger. – Ger. – Eng.) vs. *Dampf – heat – steam* (Ger. – Eng. – Eng.).

The results in Figure 2 for SAM Primes indicate lower RTs for the *related* level and again RTs for German are shorter than their respective English counterparts. Yet the ANOVA revealed the lack of significant priming effects (F (1,1) = 1.7532, $p = 0.4118$). Relevant sample sequences for SAM Primes would include *steam – lawn – Dampf* (unrelated) vs. *steam – heat – Dampf* (related), and *Dampf – Rasen – steam* (unrelated) vs. *Dampf – Hitze – steam* (related).

Tables 3a and 3b provide an overview of the various TE Prime – SA Prime – Target combinations, including mean RTs and standard deviations for each of the conditions.

One pattern that seems to emerge is that triplets introduced by German TE Primes yielded in general shorter RTs than their English counterparts on both the *related* and *unrelated* levels. These results come rather close to marginal significance (if one accepts an a-level of 0.10) with F (1,1) = 14.198 and $p = 0.1651$. Also, when the following SA Prime was in German, such a combination brought about an advantage when compared to TE Primes followed by English SA Primes. In other words, sequences like *Dampf – Hitze – steam* and *Dampf – Rasen – steam* appeared to be advantageous when compared to *Dampf – heat – steam* or *Dampf – lawn – steam* respectively (cf. experimental conditions (c) and (d) in the introduction). This seems to indicate some sort of language advantage for German. Furthermore, this interaction between TE Primes and SAL Primes (TE-SAL) is very interesting because it *would* be statistically significant at an a-level of 0.10 (F (1, 1) = 48.004, $p = 0.0913$).

However, one should be cautious in interpreting these results because the standard deviations (SDs) in all the conditions are very large, and, on the other hand, the degrees of freedom are extremely small. The occurrence of large standard deviations indicates that the obtained data are rather heterogeneous. As the SD is associated with a fixed percentage covered under the Normal Curve, large SDs mean that a larger than usual number of values can be considered 'close' to the mean, thus decreasing the representativeness of the latter. In other words, obtaining large SDs forces one to accept a larger number of values as representative or probable; had one obtained a small SD, such values could have been considered less representative. In short, the accuracy of the mean is a function of the SD obtained: small SDs render the mean more accurate or powerful than large SDs (cf. Glass & Hopkins 1996:88). In spite of that, the results are still astonishing given that according to the concept mediation hypothesis, the mother tongue should not play a role at all in bilingual processing (cf. Potter et al. 1984). A possible reason for the results obtained could be a difference in the difficulty of the sequences initiated by English and German primes.

All the other possible interactions are far from being significant at either the .05 or .10 a-levels. Still, the pattern of German items being processed faster also persists in those conditions.

2. CONCLUSIONS. The present study was concerned with the processing of translation equivalents presented to English-German bilinguals in the form of triplets. A TE Prime was followed by a SA Prime and a Target. This new paradigm was chosen to test various experimental conditions concerning language and meaning which was why the SA Prime consisted of a meaning and a language level (SAM vs. SAL). It was thought that by manipulating the various levels of the SA Prime one could gain more insight into the role of concepts in bilingual processing because it was assumed SA Primes could serve as such if they belonged to the same semantic field as the TE Prime and the Target. If the SA Prime did not belong to the same semantic field, on the other hand, there should have been a potential of disrupting bilingual processing. The results of the analysis of variance, however, yielded only few marginally significant results. There were no significant results for SA Primes which means the goal of learning more about factors capable of influencing concepts in bilingual processing has not been achieved: it has not become clear which role language and meaning play in this respect.

Thus, to come back to the various experimental conditions introduced at the beginning of the present study, neither condition (a), which was concerned with SAL Primes, nor condition (b), which was concerned with SAM Primes, reached statistical significance. This is an astonishing results for both *language* and *meaning* were initially thought to be the most important priming factors. Conditions (c) and (d), which were concerned with language-meaning interactions (SAL-SAM) also failed to produce statistically significant results. The only data that were in the vicinity of statistical significance were those obtained for TE Primes and the interaction of TE Primes with SAL Primes, a phenomenon that hinted at processing advantages for German items.

On the one hand, the goal of obtaining more detailed information about factors capable of influencing concepts in bilingual processing has not been reached; it was hampered by the lack of statistically significant results. These insignificant results, however, appear to still have some value because one can claim that they are at least *compatible* with the Concept Mediation Hypothesis. On the other hand, the results of the present study may give hints as to how the experimental design can be improved because a lack of statistically significant results does not necessarily entail a complete failure of the design. And in addition to this, the analysis above is based on both large SDs and small degrees of freedom. Changes to the design of the experiment could include replacing visual SA Primes by auditory ones which would discourage participants from 'skipping' the second word in the sequentially presented triplet. The time items are presented on the screen could also be altered. Finally, choosing different (simpler?) experimental stimuli could also be helpful. After all, the comparison of experimental items and control items established that the basic design does work. Thus, making appropriate changes to the latter and enhancing the statistical power may yield the desired results. Only future experimentation, however, will show whether this can be achieved.

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[1] Special thanks go to Gary Libben, Terrance Nearey, Miss Marta Laube and three anonymous reviewers for their valuable comments on earlier drafts of this article.

[2] SAL Primes and SAM Primes cannot be really separated for illustrative purposes as they represent two different characteristics of the same word, namely the *language* and *meaning* levels. They can, however, be separated for statistical purposes.

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THE DEVELOPING LEXICON: MORPHOSYNTACTIC KNOWLEDGE IN FIFTH GRADE CHILDREN

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Much attention has been given to ascertaining the nature of the mental lexicon through the use of literate adult subjects (generally university undergraduates). Psycholinguists have also given a good deal of attention to the nature of lexical development in pre-literate children. In between early child language acquisition and the nature of the adult mental lexicon, however, is a vast and relatively unexplored frontier. The language skills that are mastered in the first few years of life are so impressive that a child of five already appears to be a master of his/her language. Beyond this rapid initial period of linguistic growth, however, development appears gradual and difficult to determine. Perhaps as a consequence, comparatively little attention has been devoted to understanding the development of the mental lexicon beyond the early years. However, as educational research has made clear, children's vocabularies grow at astounding rates through the grade school years (Jenkins & Dixon 1983, Nagy & Anderson 1984, Nagy & Herman 1987). Thus, by implication, the nature of the 'mental lexicon' changes and develops and it is of some import to understand the nature of this development.

In this paper, we are concerned with an aspect of lexical knowledge that is undergoing development in the grade school years. Specifically, we are concerned with differences between the morphosyntactic knowledge of fifth grade children (10 year olds) and that of literate, educated adults. To investigate morphosyntactic knowledge we probed children's and adults' intuitive knowledge of the syntactic functions of derivational suffixes. The study of derivational suffixes can give us insight into the lexicon-syntax interface because suffixes are obviously parts of lexical items that have some semantic content as well as syntactic functions. In the word *teacher*, for example, the *-er* indicates an agent (semantic content) and also marks the word as a noun (syntactic function). Clearly, knowing something about the syntactic functions of derivational morphology is part of lexical knowledge.

The syntactic aspect of derivational knowledge (cf. Tyler & Nagy 1989) involves knowledge (tacit or explicit) that derivational suffixes mark words for 'part of speech' or word class membership (syntactic category like noun, verb, etc.). For example, most words ending with the suffix *-ize* are verbs (e.g. *sympathize, visualize, traumatize*) while the suffix *-ity* marks nouns (e.g. *majority, inferiority, possibility, security*). One effect of this characteristic of derivational suffixes is that related words play different roles in sentences (e.g. *national* is an adjective while *nationality* is a noun).

Several major complications arise in an attempt to develop methodology to assess knowledge of the syntactic functions of suffixes. Perhaps the most formidable is that these syntactic category indicators are not invariant, an observation that is frequently pointed out in literature on the nature of morphology (Matthews, 1991; Henderson, 1989). In many cases, a suffix is not a reliable guide to word class information. The same form, for example, can have several functions such as the suffix *-er* which functions differently in the words *slower* (adjective) and *teacher* (noun). Syntactic category is primarily determined by word order in English so that a word like *question* can be either a noun (to ask a question) or a verb (to question someone) depending on how it is used in a sentence. Even though a word may end in a suffix that usually marks nouns, for example, other sentence context information like surrounding grammatical elements (*a, the, with, very*) and word order are needed to establish the part of speech of the word. An additional complication is that the combination of letters or sounds that make up derivational suffixes are not unique to suffixes; that is, there is orthographic (and often phonological) overlap between suffixes in derived words and letter/sound sequences in many other words. For example, the words *exhaustive, offensive* and *creative* can properly be viewed as derived words ending in the suffix *-ive* which marks adjectives; many other English words, however, also end in the sequence *-ive* which cannot be viewed synchronically in the same way (e.g. *captive, motive, forgive*).

Because of the probabilistic nature of suffixes, we looked at the performance of educated adults on a nonsense word task and then used adult performance as the target for children. This rationale subsumes information about exposure to suffixes in context; fifth grade children can be assumed to have had less exposure than educated adults but the exposure should be similar in nature. If, for example, words ending in the sound/letter sequence *-ive* are used as adjectives 90% of the time in actual language usage (oral and written), an educated adult would presumably have a strong perception of *-ive* being an adjective ending. The development of children's intuitions should be in the same direction depending on the amount of exposure to such tokens (among other factors).

Although frequency information on the relative informativenss of suffixes (e.g. the percent of *-ive* words that are adjectives) would illuminate the acquisition picture, we found this information difficult to find and translate in terms that would inform our findings. A backwards dictionary, for example, can identify words in the language that end in various letter sequences and provide word class information about the entry. Token frequencies for each type would need to be compiled to provide a relevant estimate for adults. Such an estimate, however, would not be reasonable for fifth grade children. Thus, for the purposes of this study, we did not attempt to elucidate the role of frequency information in children's performance. Rather, we assumed that educated adult intuitions took this information into account and that the standard set by adults was the standard to which children could be reasonably compared. This approach is similar to that adopted by other child language researchers who have estimated natural productivity of lexical items by examining adult performance on an experimental task (cf. Clark & Berman, 1984). Thus, the research question was as follows: Do 10 year old children understand (i.e. have they acquired knowledge of) the lexical category information implicit in derivational suffixes? That is, given the nature of English derivational suffixes, how does the performance of fifth grade children compare to that of literate adults on a task designed to probe intiuitve knowledge of the syntactic functions of English derivational suffixes?

1. METHOD

1.1. PARTICIPANTS. The target population for this study was native English speaking fifth grade students in a large (population approximately 626,000) midwestern city in Canada. To ensure a sample that was broadly representative of the population, the city was divided into five geographical areas and several schools were randomly selected from each area. The sample was drawn from 15 fifth-grade classrooms that supplied a possible 402 participants representing all levels of SES. All students who received parental permission and were present at the time of testing participated in the project but, for the purposes of this analysis, data were excluded from students who were not native English speakers or who were identified by school criteria as learning disabled or linguistically delayed in some way (since the study was limited to normally developing fifth grade children).

The final sample consisted of 301 fifth grade students. Females accounted for 55% of the sample while males made up 45% of the sample. The mean age of this group was 10 years, 4 months and the median age was 10 years, 3 months. While ages ranged from 9 years, 8 months to 11 years, 11 months, the majority of students' ages (90%) fell between 9 years, 9 months and 10 years, 9 months. Thus, there was considerable homogeneity in age in that the bulk of the sample was less than a year apart in age.

Adult participants were 29 graduate students who were attending a non-credit workshop on language analysis in a well-known research university on the East coast of the USA. All students were native speakers or had an extremely high level of English competence as required for graduate school admission. Thus, these adults represent highly educated English speaking adults from a variety of backgrounds.

1.2. MATERIALS. This study utilized a nonsense word production task where the objective was to get children to produce sentences using nonsense words that ended in real English suffixes (that presumably coded part of speech information). The stimuli for the task consisted of 10 nonsense words with real English derivational suffixes: four noun (*-ment, -ness, -ity, -(t)ion*), three adjective (*-less, -able, -ive*) and three verb (*-ize, -ate, -ify*) suffixes were included. The pseudo-stems for the nonsense words were created with respect for the constraints of real English words (e.g., *str-* is an allowable word initial consonant cluster whereas *tzr-* is not). The resulting stimuli were, therefore, possible but non-occurring words in English (see Smith, 1998, for further discussion).

Three training examples were constructed to show students that nonsense words could be put into a variety of acceptable sentences (e.g. *That girl is* ***prastful****. They had a* ***prastful*** *time at school*). The training examples used suffixes that are generally mastered quite early in development; the suffix *-er*, for example, is comprehended and produced by children as young as 3–5 years old (Clark and Hecht, 1982; Clark & Cohen, 1984). Two of the three suffixes used in the training examples had more than one syntactic function (e.g. *-ly* is found on adverbs such as *slowly* as well as adjectives such as *lovely*). Thus one training example could show the same suffixed nonsense word in several different syntactic roles. The task directions were constructed to convey the idea that, just like real words could be used in sentences, the same could be done with the nonsense words in the task. It was clearly conveyed to students that (1) since the words were not real words, they could mean whatever the student wanted them to mean, (2) there was no particular 'right' answer and (3) the experimenter was only interested in the kinds of sentences people made when given 'fake' words. Full task directions and further discussion about the design of the task can be found in Smith (1998).

1.3. PROCEDURE. The children's nonsense word production task was administered as the third task in a series of tasks tapping morphological knowledge. After working through the training examples, the student was asked to try to make up some sentences with some fake words. The student was then presented with each of the 10 stimuli items in turn (all students saw and heard the stimuli in the same randomized order). Presentation was both visual (nonsense words were clearly printed on cards of a uniform size) and oral (the examiner pronounced the word several times) with an emphasis on listening to the pronunciation of the word. Each student was given as much time as needed to come up with a sentence. All sentences were equally accepted with the exception of cases where students changed the nonsense word (such as by adding an inflectional ending). In these cases, the student was asked to try again without changing the nonsense word. The examiner repeated each sentence for student verification and tape clarity. If a student's sentence was not clearly heard, he/she was asked to repeat it. If a student had difficulty thinking of a sentence, the item was set aside and the student was encouraged to give it another try after the other items had been completed. The task was tape recorded and the students' sentences transcribed.

Some minor changes were made in the administration of the task to adults. An adult version of the task was administered to 29 graduate students in one half hour session. Participants were not told the purpose of the task prior to the collection of their productions. The adult version of the task used the same stimuli items as the children's task but the graduate students were directed to write their sentences on a response sheet that was provided. Task directions and training examples were adjusted for presentation to a group of adults. Students saw the nonsense word in print (each stimulus item was written on the chalkboard and displayed on a large card as introduced) and heard the item (the experimenter pronounced each item several times while giving the students time to write a sentence using the nonsense word).

1.4. CODING. After transcription, a three-tiered scoring system was applied. Full points (two points) were assigned to productions where the participant (child or adult) had used the nonsense word unambiguously in accordance with the major syntactic role of the appended suffix. That is, it was clear from word order and other grammatical elements in the sentence (*a, the, very,* etc.) that the suffixed form was used in the syntactic role indicated by the suffix. For example: *The* ***fladment*** *was destroyed in the accident*. No points (0 points) were assigned if the nonsense word was unambiguously used in a role that was clearly not in accordance with the usual role of the suffix. For example: *I* ***tropanity*** *every day* (the word with the noun suffix *-ity* is used as a verb). Ambiguous constructions that did not include the possibility of correct usage were also assigned a score of zero. For example, in the sentence '*The trees and grass are* ***grastify***' the nonsense word is either a noun or an adjective but cannot be a verb as indicated by the suffix (*-ify*). Partial points were assigned to ambiguous cases where the ambiguity included the possibility that the suffixed word was functioning in accordance with the usual role of the suffix. For example, the nonsense word in the sentence '*I feel* ***tropanity*** *today*' could be either a noun or an adjective and, since *-ity* indicates a noun, the production was given partial points. Productions assigned partial points, however, were not included in the analyses presented in this paper.

1.5. ELIMINATION OF PROBLEMATIC ELEMENTS. Some cases or items were eliminated from the analyses presented in this paper. On a few items, several children produced more than one sentence. This situation may have resulted from self-correction or from the experimenter's request to repeat a sentence or to use the word that was given (rather than add an inflection such as using *grastified* instead of the given item, *grastify*). These items were difficult to score because it was unclear whether to count the first sentence, second sentence or the best sentence. For the purposes of this paper, then, these items were eliminated from the analysis.

A number of cases were also eliminated from the analysis on the basis of response bias. That is, some children showed a bias to form sentences with only one kind of framework such as all adjective frames (*'He is very X'*) or definition-type noun frames such as '***Tropanity*** *is XYZ.*' Children who produced sentences with only one kind of framework in 9 or 10 out of 10 possible cases were eliminated from further analyses. In total, 54 cases were eliminated for this reason (49 children showed a bias for adjective frames and 5 children showed a bias for noun frames). One child's data could not be analyzed because of a tape malfunction. As a result, the items available for analysis were produced by the remaining 246 children.

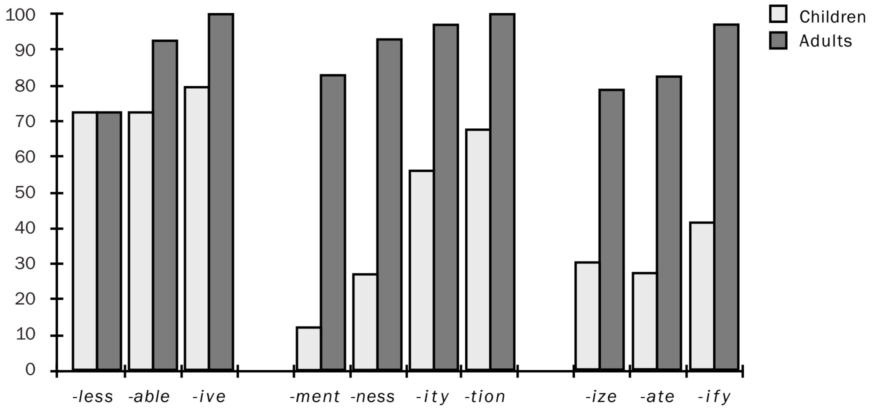

Figure 1. Percentage of adults and children's responses that were assigned full points, by suffix.

2. ANALYSIS AND RESULTS. Figure 1 addresses the main research question of whether adults and 10-year old children use nonsense words with real English derivational suffixes in the same type of sentence frames.

Figure 1 shows the percentage of adult and children productions that were assigned full points. From this figure, it is clear that children had many fewer productions that were assigned full points than adults did. A series of Chi-square analyses, comparing the 'zero points' and 'full points' responses by children and adults showed that there was no significant difference in the distribution of responses for the item suffixed in *-less* ($\chi^2 = 0.46$, n.s.). However, all other differences were highly significant.

From the data presented in Figure 1 it is clear that literate adults treated the nonsense words as having syntactic category information according to the appended suffixes and (almost unanimously) they constructed sentences unambiguously using the nonsense words as those respective parts of speech. The children's morphosyntactic knowledge (that is, knowledge of syntactic category information in derivational suffixes), however, is not on a par with that of literate, educated adults. Quite clearly, this aspect of linguistic knowledge is still developing in children of this age.

Some interesting differences emerged with respect to types of suffixes. Most notably, mastery of verb suffixes appears consistently low while mastery of adjective suffixes is consistently high (in one case, on a par with adult usage). The most variability in usage appears in the group of noun suffixes where children are doing better with the suffixes *-ity* and *-tion* than with *-ment* and *-ness*. Interestingly, the pattern of performance in the children's data is mirrored in the adult data. For example, sentences containing the *-ment* item were assigned full points less often than sentences containing the other suffixed items in both the child and adult data and both children and adults obtained full points most frequently for the item suffixed in *-tion*.

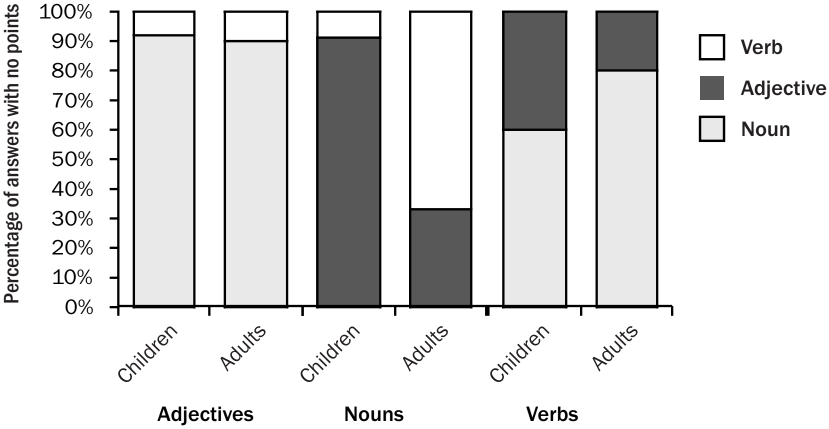

Figure 2. Sentence slot used when no points given.

A second research question addressed the question of the kinds of 'errors' that children and adults made. That is, when a production was scored as zero points, how were the adults and children using the suffixed nonsense words? Did children and adults make the same kinds of errors and was there anything systematic about these productions? Figure 2 illustrates the answers to these questions.

Figure 2 shows how the participants used the suffixed nonsense words in productions that were scored as 'no points.' In interpreting this graph it is important to recall that adults made very few 'errors.' Thus, the adult columns are based on only a few cases whereas the children's columns represent a substantial proportion of the children's productions.

The data in Figure 2 reveal similarities between the child and adult errors. In the case of nonsense words ending in adjective suffixes (*-less, -able, -ive*), the predominant 'error' is use as a noun. This is clearly the case for both children and adults. In the case of items with noun suffixes (*-ment, -ness, -ity, -tion*), the children's errors tend to be primarily adjectives. The similarity with the adult data is not revealed here because adults made only three errors in total (one adjective and two verb usages). Both the child and the adult data show that there is a slight preference for noun frames in the 'errors' associated with items ending in verb suffixes (*-ize, -ate, -ify*).

These productions that were scored as 'no points' may reflect some kind of knowledge about syntactic category information in suffixes. One possibility is that these responses show (implicit) awareness that the category information in suffixes is not invariant. For example, although *-less* is primarily an adjective suffix, words ending in -less can sometimes be used as nouns as in the following sentences: *The people were* ***homeless*** (Adj) and *They gave food to the* ***homeless*** (Noun). Similarly, *-ate* is primarily a verb suffix but it is not uncommon to find words ending in (orthographic) *-ate* used as nouns or adjectives as in the case of *The* ***graduate*** (Noun) *was* ***compassionate*** (Adj). Thus, these errors may reflect implicit knowledge of possible roles that words with these suffixes can play and the data reveal that children's errors are in the same direction as those of adults suggesting that children of this age are acquiring this linguistic knowledge.

Several other analyses were conducted to address the question of whether participants were utilizing other information about lexical category in this task and whether other differences could be detected between the adult and child data. Specifically, we were interested in the quality of the productions that were assigned full points. For example, the nonsense word 'snarkness' is used as a noun in the sentence *That person has much* ***snarkness*** (adult production) and in the sentence *My dog has a big* ***snarkness*** (child production*).* Both of these productions were therefore assigned full points although, subjectively, there seems to be something qualitatively 'better' about the adult sentence. The question that arises, then is the following: When children get full points for their productions, does it mean they have attained adult-like proficiency?

In order to address the issue of production quality we considered other characteristics of one noun suffix (*-ness*) and two verb suffixes (*-ize* and *-ify*). In the first case (noun suffix), an examination of a list of real words ending in *-ness* indicated that this suffix is almost always used to form MASS, rather than COUNT, nouns (as in the words *correctness, forgiveness, illness* and *sadness*). We questioned, therefore, whether participants who used the nonsense word ending in the suffix *-ness* as a noun (thereby getting full points) would also use the item as a mass (rather than a count) noun. In addition, we questioned whether there would be any difference in this respect between adults and children.

To address the questions concerning the count/mass noun distinction, we tabulated the instances where children and adults produced sentences using the nonsense word ending in *-ness* as a count noun and those where the item was used as a mass noun. Of course, the fact that we were working with nonsense items required an operational definition of 'count' and 'mass' noun. All productions using the *-ness* nonsense word as a noun were coded in one of three ways: (1) The stimulus item was considered a count noun if the article 'a' appeared before it, as in the sentence *That dog has a big* ***snarkness.*** (2) The item was counted as a mass noun if no article or the word 'some' or 'much' was used in front of the word as in the sentence *I was swimming and I made a lot of* ***snarkness.***' (3) Items were counted as unclear if the words 'the', 'his', 'her' or 'their' appeared in front of the word as in the sentence *He was scared of the* ***snarkness***. Only the clear cases of count and mass nouns were considered in the analysis.

Of the clear cases, almost all the adults and the majority of children used the stimulus item as a mass (rather than a count) noun. The difference between adult and child usage was not statistically significant ($\chi^2 = 2.14$, n.s.). This result implies that adults and children who have learned the syntactic role of the *-ness* suffix have also acquired the semantic nuance of the suffix (it is used on mass nouns). These results are more suggestive than conclusive however as the operationalization of 'count' and 'mass' nouns was limited and the majority of cases were, in fact, unclear.

Thus, differences between child and adult productions may have been masked by the limitations of the analysis. An examination of productions that were tabulated as count nouns is suggestive. Very few adults used the *-ness* stimulus item as a count noun (only 2 out of 29) but even those who did showed an appreciation of the semantic nuance (*The doctor responded with a* ***snarkness*** *in his voice. A* ***snarkness*** *covered the valley and chilled us to the bone*). In contrast, many child uses of the stimulus item as a count noun lacked this appreciation of 'snarkness' as an intangible quality and indicated a countable, 'thing-like' nature (e.g. *He has a very big* ***snarkness****. I have a pet—it's a* ***snarkness****. He was afraid of the shark so he sometimes called it a* ***snarkness*** *instead of a shark*). Further work is needed to explore the acquisition of semantic nuances of various suffixes but an examination of productions suggests that 10 year old children have not yet attained adult-like proficiency even if statistically significant differences were not detected in the child and adult data noted here. The data also raise the issue of some syntactic distinctions being acquired before some semantic nuances. It is possible, for example, that children must first acquire (implicit) knowledge of the syntactic function of a suffix like *-ness* (it marks a noun) before they learn the semantic nuances associated with the suffix (it marks a 'mass' versus a 'count' noun).

A second analysis regarding qualitative differences in productions given full points focused on two verb suffixes (*-ize* and *-ify*). An examination of real verbs ending in these suffixes revealed that these suffixes are generally used on transitive verbs (those requiring a direct object) as can be appreciated by an attempt to use the following verbs in a sentence (*categorize, neutralize, recognize, visualize, mystify, specify, terrify, fortify*). Since real words ending in these suffixes tend to be transitive, we questioned whether those participants who used the nonsense words ending in these suffixes as verbs would also use them with a direct object in their sentences. Further, we questioned whether there would be discernible differences in how children and adults used the stimuli items (when they received full points for using the items as verbs).

To address these questions, we first examined all cases where participants used a nonsense word as a verb. Table 1 (overleaf) shows the tabulation of children and adults who used nonsense words as verbs and the number of times the nonsense verbs were used with and without direct objects. Three of the stimuli used as verbs had verb suffixes *(-ize, -ify* and *-ate*); 'other' cases are stimuli not specifically suffixed with a verb ending but nonetheless used as a verb (e.g. I'll *tropanity* that).

Table 1 suggests that adults have a preference for using verbs transitively whether or not a direct object is required. Although the pattern is similar for children when the stimuli require a direct object (*-ize* and *-ify* items), no such tendency appears in the children's data when the stimuli do not require a direct object. This suggests that children are learning the argument structure associated with transitive verbs. To examine this issue more closely, we focused on the two stimuli that represented transitive verbs. We calculated how often a direct object appeared in sentences using the nonsense words ending in *-ize* and *-ify* as verbs. Transitive use of the nonsense

Stimuli	Participants	No Direct Object	Direct Object	
bromize	Children	25	42	
	Adults	8	15	$\chi^2 = 0.29$
grastify	Children	29	66	
	Adults	6	22	$\chi^2 = 13.54$
straferate	Children	39	27	
	Adults	9	15	$\chi^2 = 57.76$
All others	Children	27	9	
	Adults	0	3	$\chi^2 = 17.25$

Table 1. Number of children and adults who used nonsense words as verbs with or without direct objects.

verbs included sentences like '*I can bromize words*' and '*That graph will grastify your sight.*' Productions given full points for verb usage but without a direct object include sentences like '*Let's bromize together*' and '*When reading maps, I always grastify.*' Figure 3 shows the percentage of children and adults who used a direct object when they used a nonsense word ending in *-ize* and *-ify* as a verb.

Figure 3 reveals that the majority of both children and adults who used the stimuli as verbs also used them as transitive verbs. With an *-ize* nonsense word, children formed transitive sentences equally as often as adults (the difference is not statistically significant, $\chi^2 = 0.29$, n.s.). The difference between children and adults is statistically significant in the case of the *-ify* stimuli ($\chi^2 = 13.54$, $p < .01$), indicating that adults formed transitive sentences slightly more often than the children did. Interestingly, these results suggest that, although the majority of children have not acquired *-ize* and *-ify* as verb markers even by 10 years of age (see Figure 1), those that did use these suffixed nonsense words as verbs also used them as transitive verbs (Figure 3). Thus, along with the syntactic category information, information about argument structure has been acquired by the minority of children that (implicitly) recognized the nonsense words as verbs.

CONCLUSION. The data from this study confirm that literate adults have strong intuitions about the syntactic functions of derivational suffixes and the semantic nuances of these suffixes. This suggests that derivational suffixes may have some status independent of stems in the mature mental lexicon.

Similarities and differences between the data produced by children and adults suggest, however, that suffixes may only gradually attain a status independent of stems in the mental lexicon. The data show, for example, that in many cases 10-year old children did not use the suffixed nonsense word in accordance with the primary syntactic role of the suffix. This suggests that these children did not understand (implicitly) or did not have strong intuitions about the syntactic functions of derivational suffixes. Further, even when children do show an appreciation of the

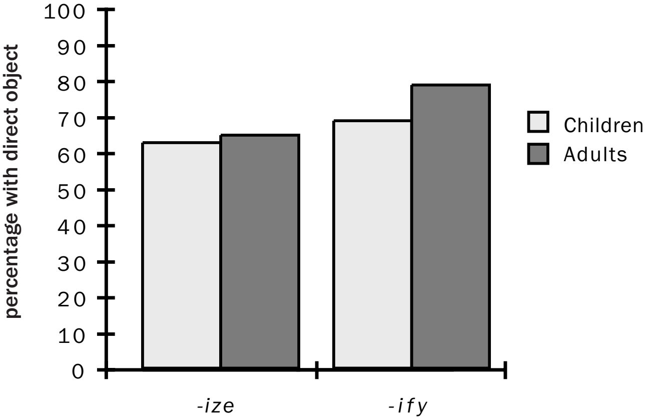

Figure 3. The percentage of children and adults who used a direct object with two of the nonsense verbs.

syntactic category suggested by the suffix, there may still be some nuances inherent in suffixes that may not be mastered. So, for example, only approximately a third of the children in this large sample appeared to have mastered verb suffixes (appreciated the syntactic category of the verb suffixes) and of those who did, some appeared to still be learning the direct object distinction associated with those suffixes. However, once the syntactic category information is acquired, other semantic nuances seem to be well underway suggesting a strong lexical-syntactic interface.

This study suggests that the lexicons of these children are developing like those of educated adults. As a group, these children's intuitions about syntactic category are moving towards those displayed by the adult group. Similarly, intuitions about subtle nuances (like mass noun, direct object distinctions) associated with real words with these suffixes are evolving towards adult standards. Children's errors on this task are also in the same direction as adults suggesting that they are aware of other information about suffixes that adults know such as the fact that the same suffix can appear on words with different syntactic roles. While there is still much to be learned about the subtle interactions involved in the lexical-syntactic interface, this study suggests that morphosyntactic knowledge in fifth grade children is still developing and that intuitive awareness of syntactic category information plays an important role in the growth of lexical knowledge.

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◆

MASTERING ENGLISH PREPOSITIONS IN PHRASAL VERBS

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This paper concerns combinations of verbs and prepositions in English. Verbs and prepositions combine both as separate parts of speech and as members of a single grammatical construction, often referred to as phrasal verb. The term *phrasal verb* follows the grammatical traditions of last century because it distinguishes a verb-preposition combination from collocations including multiple parts of speech, as with verb+noun+preposition in *set fire to* or *find fault with* (Potter 1965). This study adheres to traditional grammar in so much as it is limited to combinations of one verb and one preposition in phrasal verbs, differing from the more common verb-preposition combinations containing two separate parts of speech.

Commonly, English prepositions function primarily to denote a spatial configuration as in (1)a (Quirk et. al. 1985). When functioning spatially like (1)a, a preposition acts as head of its own prepositional phrase and associates syntactically with its object, unlike cases (1)b or (1)c and (1)d. The combination in (1)a incorporates two individual grammatical constituents while (1)b–c comprise the single grammatical constituent phrasal verb, which in (1)c–d enjoys nonfixed syntax.

(1) a. Max sat on the books.
b. Max decided on the books.
c. Max sent on the books.
d. Max sent the books on.

In the instances of nonfixed syntax, a preposition does not head a prepositional phrase but associates with the verb as one of its internal arguments and thus fulfills an aspectual semantic role. More basically, as with instances in (1)a, prepositions fulfill a spatial semantic role and demonstrate fixed syntax because they are phrasal heads that come to the left of their objects. Oddly, instances in (1)b exhibit a nonspatial semantic role that also demonstrate fixed syntax like spatially functioning phrasal heads. I call such instances idiomatically functioning prepositions because semantic function cannot be deduced from spatial meanings.

This study analyzes the semantic function and syntactic usage of aspectual prepositions and reports on instructional treatments for this grammatical construction with speakers of English as a Second Language (ESL). Learning the function (meaning) and usage (clausal position) of English prepositions is one of the most difficult problems facing ESL students (Heaton 1965, Takahashi 1969, Meyer 1975). Yet the problems that prepositions present to adults learning English also exacerbate teaching prepositions (Cornell 1985). In fact, difficulties that students encounter may be directly related to instructional methods since teachers do not 'offer a logical explanation for the occurrences of prepositions or a conceptual guide for their usage' (Takahashi 1969:217). Instruction, therefore, can deter mastery of phrasal verb prepositions if students are not helped to follow some form of logic in their function and usage.

I approach the problem of logical function and usage from a theory of mapping, linking lexical meaning and grammatical form, and I use an instructional treatment on phrasal verbs for assisting form-meaning mapping. This study thus concerns an intersection of pedagogical grammar and linguistic theory. I begin with the theoretical analysis and then move to instruction.

2. THE MEANING OF PHRASAL VERB PREPOSITIONS. Tenny's (1994) analysis of phrasal verb prepositions views them as introducing a temporal end-point that 'measures out' an action predicated by a verb. These prepositions specify that actions 'travel through' a phrasal verb object completely (see Bolinger 1971). The semantic function of such prepositions does not denote 'space' but acts aspectually as a 'telicizer' (Carlson 1997). Telic events possess a temporal bound indicating the completion of a predicated action. Tenny's analysis is augmented by Dowty's (1979:118) interpretation of a semantic operator DO that denotes a 'state under the unmediated control of the agent' and also by Kratzer's (1994) critique of a light-verb 'do' that operates as a functional head introducing a semantic argument AGENT for verbs in a generative phrase structure marker.

Tenny (1994:2) proposes a theory that links semantics and syntax, two modular systems 'visible to each other through a narrow common vocabulary'. Linking a lexicon to phrase structure is achieved through telicity. Telicity is not a property of the verb but realized by the constituents internal to the verb phrase. An example of Tenny's (ibid:11) is *Tom ate an apple up*, where the aspectual role of direct object apple measures out the event. Measuring-out acts as a constraint included in a vocabulary shared by semantics (aspectual terminus) and syntax (internal argument). The measure-out system lacks a parameter for the subparts of the verb phrase's event structure (spatial extent of affected object and distance/time of performing an action to be unified with the object's change-of-state). A verb phrase headed by *eat* has only degrees of a temporal bound, as in *eat an apple halfway*. The preposition up supplies the verb phrase with an end-point for its measuring argument object (one cannot eat an apple up halfway): The spatial extent of an object is totally affected and completely changed as an upshot to action. Tenny borrows Bolinger's (1971) features 'motion-through-location' and 'result/terminus'[1].

The phrasal verb receives a similar interpretation in Dowty (1979). It is subsumed under factitive/instrumental construction (as in *hammer the metal flat*) because it denotes a causal activity and a resulting state (Dowty 1979:91–99). Following Fraser's (1976) analysis, that phrasal verb prepositions either hold an activity constant and vary the resultant state or vice versa, Dowty argues against phrasal verbs that are single lexical items of compound verb-preposition and for 'compositional accomplishment constructions of activity verb and particle that express a state' (1979:94). His analysis leads him to infer semantic operators CAUSE and DO (Ross 1967). The latter operator suggests the transitivity of controllability—that is, if an activity is controllable, then the causation of another event by that activity is also controllable. Though not a direct translation of a 'transitive-controllable' operator, Kratzer's (1994) semantic analysis of external arguments touches on agency interjected by functor verb 'do'. As a functional verb node, 'do' is presumably empty yet contains a lexical element that selects an agent and fulfills the functional application needed to fit an external argument to the aspectual properties of verb phrases.

I claim a similar function application for internal arguments is what phrasal verb prepositions in English accomplish, and perhaps in other languages. Salish preposition 'particles' mark degrees of control of agent-over-action as in *kwis* 'to fall' (out-of-control), *kwis (t)s* 'to drop' (neutral-control), and *kwis in* 'to throw down' (full-control) (Davis & Demirdache 1997). In 'throw down', the particle carries the full-control as well as a 'path' reading related to phrasal verb prepositions. A path from initiator agent to affected object is encoded by these prepositions that locate source/origin of action and determine an end-point, a dynamic situation involving change from 'an initial state to a terminal state' (Binnick 1991:188). Aspectual prepositions mark 'path', but they also heighten volitionality/agency such that the more volitional/agentive an action is, the more dynamic it is (Binnick 1991). The feature of volitionality/agency is related to control of cause. James Huang (personal communication) attributes control to the *ba* construction of Chinese and interprets *ba* not as a preposition but as a light-verb (the Chinese progressive marker *zai* is preposition 'at', which Huang also interprets as a light-verb). I accept the control semantics for phrasal verb prepositions but not light-verb syntax; instead, I favor Brinton's (1998) analysis of these prepositions as retaining a remnant of their spatial function (i.e., an iconic path-goal)[2].

3. INSTRUCTION IN PHRASAL VERB SYNTAX. The experimental treatment for this study is Input Processing (IP) instruction (VanPatten 1996, Lee & VanPatten 1995). This pedagogical method directs students' attention to a grammatical construction without making them aware it is being instructed. Such form-focused exercises have been employed by second language acquisition (SLA) researchers in classrooms where grammar is taught implicitly through exposure to natural input that is mostly understood. Natural input prompts development of second language knowledge by involving students in the use of understanding new meanings (Krashen 1985, Krashen & Terrell 1983)[3]. IP instruction adheres to the assumption that input manipulated for comprehensibility will push second language development forward, so it is more effective than explicit grammar instruction explaining rules.

IP provides a way to describe for ESL learners the varying roles that prepositions play in phrasal verbs. The procedure of this instruction follows three steps (VanPatten 1996, Lee & VanPatten 1995):

1. The first step is to explain a mapping relation between a grammatical form and its meaning.
2. The second step is to inform learners of language processes interrupting the correct mapping relation
3. The third step is to implement *structured input* activities so that students have the opportunity to focus on form in the input. These activities draw students' attention to second language grammar by altering the input. Input containing the grammatical form being taught is presented to students, and then they are asked to make decisions based on the form's meaning (picture matching, agree/disagree, select alternative, etc.). When input is presented in this way and students attend to the meaning of the form in order to make a decision, input becomes *intake*, a portion of input understood and subsequently processed beyond short-term memory to the developing grammatical system. The term 'structured input' describes how the activities work: They require students to only process a target form, not produce it (hence *input*), and students focus on a manipulated form highlighted in various ways (hence *structured*).

This research includes data collected from ESL students residing in the U.S. for an average of less than 9 months[4]. I used pretests and posttests to examine comprehension and production of phrasal verb prepositions. Yes-No question/answer tasks are useful data-elicitation instruments in experiments on phrasal verb comprehension (Van Hout 1997a, 1997b). These tasks present short narratives accompanied by a sequence of illustrations. Subjects listen to the narratives and view three illustrations before being asked in phrasal verb form about the completion of the activity.

(2)	PICTURE 1:	Girl holds ice cream cone in hand.
	NARRATIVE:	'Here is a hungry little girl with an ice cream cone'.
	PICTURE 2:	Girl bites into ice cream cone.
	NARRATIVE:	'She is not very hungry, so she only takes one bite'.
	PICTURE 3:	Girl holds remaining ice cream cone.
	PICTURE:	'See, here is the ice cream cone. Some of it remains'.
	TEST QUESTION:	Did the little girl eat up the ice cream? YES or NO

Sentence-completion tasks have been use in previous IP research (VanPatten & Sanz 1995, VanPatten & Cadierno 1993) and proved effective in eliciting production data. The task requires subjects to complete a second sentence that is part of a compound sentence linked by a coordinating conjunction. The sentence to be completed includes a verb-preposition combination in which the preposition functioned spatially, idiomatically, or aspectually (seven of each in staggered order).

Treatment	M	SD	SEM	N
IP	5.32	1.20	0.21	34
Explanation	4.76	1.14	0.19	37

p=.023

Table 1. Independent-samples T-test of posttest results.

(3) the teacher needed a solution to the problem,
so he ________________________________.
(it - over - think)

Results show that ESL students given IP instruction in phrasal verbs perform significantly better at the comprehension task than those provided explicit explanations. Production data are not significant in terms of instruction, but the tasks yielded significant results for the frequency of prepositions' functions.

4. EMPIRICAL RESULTS. I used an independent-samples t-test to determine whether a treatment effect could be detected in the comprehension data. A one-tailed independent-samples t-test on posttest data produced a significant p value. The results of that analysis are in Table 1.

The mean score (M) shows that the average posttest score was 5.32 out of 7 for the IP group and 4.76 out of 7 for the Takahashi group. The standard deviation (SD) shows the range of variance in scores for each group, and the standard error of the mean (SEM) shows each mean's theoretical distribution based on all possible samples taken from that population. The population number (N) shows how many subject were in each group. I conclude from this test that a treatment effect for IP was probably responsible for the difference between the two groups' means.

To confirm this finding, I investigated the performance of each instructional group. I used a paired-observations t-test to see if the IP group and the Explanation group showed significantly higher scores on their posttests in comparison to their pretests. A paired-observations t-test is used to detect if the difference between posttest and pretest scores is significant. Significant differences indicate a treatment effect, and no significant differences indicate no treatment effect. The results from the analysis are in Table 2 (overleaf).

The mean score (M) shows that the posttest score in the IP group increased by an average of 1.059, a significant gain. The mean score (M) shows that the posttest scores in the Explanation group increased by an average of .459, not a significant gain. The subjects treated to IP instruction made significant gains in the posttest in comparison to their pretest scores while the Explanation group did not. Again, I conclude a treatment effect.

No significant values are related to instruction in the production data. However, interesting phenomena are revealed by analyses of the test items. I used one-way ANOVAs to analyze the items on the pretests and posttests (tests A and B) for spa-

Treatment	M	SD	SEM	p	N
IP	1.059	1.5	0.281	0.0002	34
Explanation	0.459	1.7	0.257	0.11	37

Table 2. Paired-observations t-test of gains from pretest to posttest, based on instructional treatment.

tial and aspectual preposition type. Subjects scored nearly perfectly for idiomatic prepositions, so I analyzed no instances of that type. Two significant results of these ANOVAs merit discussion.

A one-way ANOVA comparing the seven aspectual prepositions to each other produced a significant p value (0.000) from pretests and posttests. The p values reveal that at least one of the seven means measured from each item is significantly different than the rest. In Tables 3a and 3b, the means for correct responses to each item (a score of 1 being a correct response) are presented, with the verb-preposition combination for which the mean is a measure.

The two items in test A with the lowest mean are *over* and *on*. The two items in test B with the lowest mean are also *over* and *on*.

A one-way ANOVA comparing the seven spatial prepositions to each other produced a significant p value (0.000) from pretests and posttests. The p values reveal that at least one of the seven means measured from each item is significantly different than the rest. In Tables 4a and 4b, the means for correct responses to each item (a score of 1 being a correct response) are presented with the verb-preposition combination for which the mean is a measure.

The three items in test A with the lowest mean are *off*, *over*, and *in*. The three items in test B with the lowest means are *off*, *over*, and *up*.

5. INTERPRETATION AND CONCLUSION. Using IP instruction in a classroom facilitates the mapping between a difficult-to-master form (phrasal verb syntax) and its meaning (affected object/resultative semantics). IP instruction is unique in that other form-focused instruction does not concentrate on fostering the mapping of meaning and form (VanPatten 1996). IP purports that the manner of intake provided to adults is much like the input that children use to acquire language by using the human language faculty, Universal Grammar (Chomsky 1995, Chomsky and Lasnik 1993, Tenny 1994). The issue involves the relationship of IP to linguistic knowledge; namely, intake given in structured input activities sustains grammatical competence as natural linguistic input does in first language acquisition (VanPatten 1996). A prevalent theory on knowledge of language claims that language exists at two levels: an external performance level where humans use language in communicative interactions, and an internal competence level where humans know language subconsciously by virtue of the faculty for language (Chomsky 1986, 1965). Structured input activities putatively recreate first language acquisition processes.

Item	M	SD	V-P Combo
1	.887	.318	point out
2	.606	.492	READ OVER
3	.887	.318	show off
4	.845	.364	carry out
5	.958	.203	fill up
6	.972	.166	put away
7	.338	.476	CHEER ON

a.

Item	M	SD	V-P Combo
1	.873	.335	call off
2	.507	.504	TALK OVER
3	.929	.257	write up
4	.634	.485	SEND ON
5	.775	.421	pass out
6	.958	.203	give away
7	.803	.401	dress up

b.

Table 3. One-way ANOVA for each aspectual preposition. (Table 3a gives results for Test A and Table 3b gives results for Test B. N=71 in all cases.)

Item	M	SD	V-P Combo
1	.916	.280	sit on
2	.676	.471	LOOK IN
3	.944	.232	run through
4	.901	.300	walk to
5	.451	.501	JUMP OFF
6	.944	.232	hide behind
7	.578	.498	STEP OVER

a.

Item	M	SD	V-P Combo
1	.956	.119	look into
2	.704	.460	FALL OFF
3	.901	.300	walk in
4	.958	.203	escape through
5	1.000	.000	sleep on
6	.761	.430	FLY OVER
7	.366	.485	CLIMB UP

b.

Table 4. One-way ANOVA for each spatial preposition. (Table 4a gives results for Test A and Table 4b gives results for Test B. N=71 in all cases.)

Structured input activities develop a second language grammatical system by cueing internal competence as input does in first language acquisition.

Production-task results do not allow me to conclude treatment effects for IP instruction. Yet some task items reveal that the performance of ESL users is influenced by prepositions' functions. The preposition *on* proved difficult for subjects when it functioned aspectually but not when it functioned spatially. A corpus study of the frequency in using aspectual versus spatial functions of prepositions (O'Dowd 1998) shows *on* is used aspectually 15% of combinations with verbs. Spatial on is used 85% of combinations, so ESL students may have difficulty using it aspectually due to infrequent uses.

Yet the aspectually functioning *over* also proved difficult to subjects while it combines with verbs as an aspectual preposition 73% of combinations. If frequency were the key factor for success rates on the tests, then *over* should be unproblematic like other aspectual prepositions. *Over* is a problem because it is spatially complex (Quirk et. al. 1985). The spatial preposition *over* can be classified as simple location (*The picture hung over the sofa*), relative direction (*She threw a blanket over the sofa*), or passage (*The kitten climbed over the sofa*). If differing classifications of spatial *over* cause poor performance in aspectual function, then we should also expect problems with the spatial function.

And we do find the spatial function of *over* is indeed problematic for ESL speakers. The relative infrequent use of *over* as a spatial preposition in combination with verbs, 24% (O'Dowd 1998), may be the source of the difficulty. This is the case for spatial preposition *up*. Two-thirds of subjects treated *up* as an aspectual preposition, and spatial *up* is treated aspectually perhaps because the preposition *up* is used 98% of combinations with verbs in its aspectual function and 2% in its spatial function (O'Dowd 1998). With the preposition *off*, its aspectual function is used 79% in combinations with verbs, and spatial *off* proved difficult. Interpreting production results centers on the frequency of prepositions functioning aspectually or spatially. ESL users seem affected by how often a preposition functions either one way or another. For aspectual and spatial functions, frequency of combinations in O'Dowd's (1998) corpus study correspond to production results.

Results from comprehension and production tasks indicate different sources of acquisition. The comprehension task results indicate that IP instruction influences acquisition by modifying input into intake. Intake induces the mapping of grammatical form to meaning, so it is construed as sustenance for UG. Production results indicate a different sustenance for language acquisition, frequency. Classroom research that controlled frequency as a factor in second language acquisition shows that frequency in input is not a complete account (Doughty and Williams 1998), plus instructional treatments based on frequency have shown gains in production only. Studies like mine highlighting grammatical constructions without controlling for frequency found significant differences in comprehending target constructions and producing target constructions accurately (Jourdenais, Ota, Stauffer, Boyson & Doughty 1995, Leeman, Arteagoita, Fridman & Doughty 1995, Shook 1994). Thus, the need for classroom intervention to complement naturally occurring factors like frequency becomes more crucial. For errors that plague second language learners who crave accuracy, instruction must involve some level of detecting the grammatical construction (Carr & Curran 1994, Tomlin & Villa 1994, Schmidt 1990).

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LEXICON–SYNTAX INTERFACE:
EVIDENCE FROM THE ACQUISITION OF EARLY VERBS IN HEBREW

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Two major orientations relate to the lexicon-syntax interface. A modular view represented by researchers like Pinker (1984, 1989), Gleitman (1990), and Crain (1991), argues for a separation between lexical and syntactic knowledge. And, an integrative view represented by researchers like Bowerman (1990), Clark (1995, 1996), and Tomasello (1992) argues that lexical and syntactic knowledge cannot be separated, and that syntax emerges in children's language as part of their lexical knowledge.

A major controversy between these views relates to how they characterize the relationship between verb syntax and semantics. Proponents of the modular approach argue that there is a systematic correlation between the meaning of a verb and the syntactic structures in which it appears. For example, Fisher, Gleitman and Gleitman (1991) found that verbs which children judged to share certain syntactic properties were also judged to have similar meanings. Within the modular view, children are granted with a universal set of word-classes (e.g., noun, verb), syntactic categories (e.g., subject, object), and thematic categories (e.g., agent, patient), and a presumably innate and universal set of linking rules. These rules are responsible for mediating between the thematic roles of a verb's arguments and their syntactic functions, and are assumed to be of the form 'link the argument bearing the agent role with the subject position'.

In contrast, proponents of the integrative view argue that 'young children's early verbs are individual islands of organization in an otherwise unorganized grammatical system. In the early stages the child learns about arguments and syntactic marking on a verb-by-verb basis' (Tomasello 1992:23), so that ordering-patterns and morphological markers learned for one verb do not immediately generalize to other verbs. No mediating mechanism in the form of linking rules is assumed. Rather, the typical mapping between thematic roles and syntactic functions is learned on the basis of linguistic experience, and there is a gradual extension of the roles associated with the arguments of a particular verb to other predicate terms.

In this paper, I argue along the lines of the integrative view, that in the early phases of acquisition the lexicon drives syntax. I present quantitative and qualitative evidence from the acquisition of Hebrew to support this claim.

1. method. Evidence for the proposed hypothesis is drawn from naturalistic speech samples of four Hebrew-speaking children, three girls (Lior, Smadar and Hagar)

Child	Age Range	MLU-W Range	Total No. of Tokens
Lior	1;5 – 3;0	1.0 – 3.5	2,383
Smadar	1;6 – 2;4	1.5 – 4.0	1,089
Hagar	1;7 – 3;0	1.5 – 3.0	2,542
Leor	1;9 – 3;0	2.0 – 3.0	4,129

Table 1. Subject information.

and a boy (Leor), between the ages 1;5 and 3;0. Subject information is displayed in Table 1. The data were taken from a large corpus, which was recorded and transcribed as part of the Cross-linguistic Language Acquisition Project conducted by Berman and Weissenborn (1991).

For the present study, I analyzed data from bi-weekly one-hour sessions with each child. The data were coded and analyzed using CHILDES with adaptations for Hebrew. All repetitions and nursery rhymes were excluded from the analysis. Sampling covered a period when there was evidence for the initial productivity of morphological inflections, and for the use of word-combinations, and simple clause-structure.

Two methodological remarks are in order. First, any discussion of evidence pertaining to acquisition brings up the problem of representativeness; that is, how truthfully the sample represents actual language acquisition and use. The database examined here is sufficiently varied to prevent context bias, and samples are frequent enough to allow detection of developmental processes. Nonetheless, the evidence presented here is meant to point to a trend rather than provide unequivocal proof for any particular approach to the lexicon-syntax interface.

Second, to avoid the circularity of determining verb argument-structure (VAS) by the data, and then reanalyzing these data for the acquisition of argument-structure, I used 'meta-argument-structures'. Here, 'meta-argument structure' refers to an idealized, fully spelled-out argument structure, which includes all the obligatory arguments required by a given verb. For example, the meta-argument structures of a bitransitive verb like *give*, a transitive verb like *wash* and an intransitive verb like *arrive* are SVOI, SVO and SV, respectively. A verb's meta-argument structure was determined on the basis of previous linguistic analyses of argument-structure in Hebrew (Berman 1982, Armon-Lotem 1997) as well as on my intuitions as a native speaker. Ideally, however, such structures would be determined by analyzing spontaneous speech samples of interactions between adult native-speakers of Hebrew. Acquisition of argument structure for verbs in the current sample was, thus, determined relative to a relevant meta-argument-structure.

2. EXAMPLES FROM THE ACQUISITION OF HEBREW. To support the integrative view to the lexicon-syntax interface, I show evidence for the following: Initially, certain verb argument structures (VAS) are rote-learned (2.1); canonical mapping cannot exclusively account for the acquisition of VAS (2.2); language typology has a crucial

Lior [1;6]
MOT: *ma ze, Lior, ma at osa?*
what this, Lior, what you-2SING-FEM do-2SING-FEM-PRES =
‘what’s this, Lior, what are you doing?’
LIO: ***tusa [: at osa].***
you-2SING-FEM+do-2SING-FEM-PRES = ‘you+do’

Lior [1;7]
MOT: *ani e’ezor lax?*
I help-1SING-FUT you-2SING-FEM = ‘I’ll help you’
LIO: ***azor [: la’azor] lax.***
help-INF you-2SING-FEM = ‘to help you (instead of me)’

Lior [1;8]
MOT: *ma nafal?*
what fall-down-3SING-MASC-PAST = ‘what fell down?’
LIO: ***fal [: nafal] la.***
fall-down-3SING-MASC-PAST to-her = ‘fell down to her’

Lior [1;9]
LIO: ***tora [: at roa].***
you-2SING-FEM+see-2SING-FEM-PRES = ‘you+see’
MOT: *ani loh roa, ani loh yoda’at le ma at mitkavenet, at omeret li: at roa.*
I not see-2SING-FEM-PRES, I not know-2SING-FEM-PRES to what you
mean-2SING-FEM-PRES, you say-2SING-FEM-PRES to-me: you see-2SING-FEM-PRES =
‘I don’t see, I don’t know what you mean, you say to me: you see’

Hagar [1;9]
HAG: ***ni li, ni li [: tni li].***
give-2SING-MASC-IMP to-me give-2SING-MASC-IMP to-me = ‘gimme, gimme’
HAG: ***bo elay.***
come-2SING-MASC-IMP to-me = ‘come to-me’

Figure 1. Frequently used verb-argument configurations.

effect on the acquisition of predicate-argument relations (2.3); verb syntax and semantics do not overlap cross-linguistically (2.4); and, input plays an important role in acquisition of VAS (2.5).

2.1 UNIQUE VERB-ARGUMENT CONFIGURATIONS. Hebrew-speaking children have been noted to acquire their early verbs, as well as certain verb-argument configurations as unanalyzed amalgams (Berman 1985, Berman & Armon-Lotem 1996).That is, as rote-learned items, initially not decomposed into their constituent structure. Figure 1 lists examples of frequently used verb-argument configurations from my sample. The examples show that each verb is acquired with a unique configuration of arguments. Certain verbs are acquired with a subject pronoun while others with a dative or an oblique pronoun. Also, children pronounce some of the above configurations as a single morpho-phonological unit, e.g., *tora* 'you+see' vs. *at roa* 'you see'. They do not use the correct person inflection on pronouns, e.g., *azor* ***lax*** 'help you'. In this example, Lior repeats the 2nd person pronoun used by her mother when she talks about herself (cf. *azor* ***li*** 'help me'). Children use segments of nursery rhymes, e.g. *bo elay* 'come to-me' (part of a nursery rhyme in which a child is asking a butterfly to come and sit on his palm). These early configurations are each used with a single verb in a unique morphological form, and with a single pronoun. Their constituent order is fixed, and they do not extend to other verbs or other lexical items. This suggests that children initially acquire each verb-argument configuration in isolation, and that they do not generalize from one configuration to another. These data corroborate cross-linguistic findings on acquisition of inflectional morphology, early word-combinations, and causative verb usage (MacWhinney 1978, 1982 and Bowerman 1974, 1982).

2.2. CANONICAL MAPPING. Proponents of the modular view argue that initially, syntax-semantic linking is regulated by 'canonical mapping' (Pinker 1984). That is, children are assumed to assign default mapping between thematic roles and syntactic functions to new predicate-arguments sequences to facilitate acquisition. The proposed mapping is illustrated below.

AGENT	THEME/PATIENT	LOCATION/GOAL/SOURCE
SUBJECT	DIRECT OBJECT	OBLIQUE OBJECT

By this mapping scheme, most Agent roles will initially be assigned to the subject, most Theme roles to the direct object, and most Location/Goal/Source roles to the indirect object. To test this prediction I examined the distribution of Agent as opposed to Theme and Source roles across all overt subjects in the early word-combinations of the four children (MLU-W range 1.5–2.5). Consistent occurrence of self-initiated and correctly ordered subject-verb sequences served as a measure for proper mapping. The data indicate that only 11%–28% of all relevant utterances had an Agent subject. Most overt subjects, 72%–89%, occurred with intransitive verbs whose subject required the Theme role. Examples of such sequences are shown in Figure 2. The prediction whereby children would use more Agent subjects in early acquisition is, thus, not borne out by the data. This suggests that children might not be using the proposed canonical mapping to acquire early predicate-argument relations.

2.3. LANGUAGE TYPOLOGY. Speakers of typoloyically different languages must learn the means available in their language for encoding predicate-argument relations. English, for example, allows a single verb in the same form to be used in both transitive and intransitive environments, e.g., *Dan broke the chair/the chair broke*; *she kissed the baby/they kissed (each other)*. In contrast, Hebrew does not generally allow

Child	Example	Gloss
Hagar	*Hagar nafal*	Hagar fall-3SING-MASC-PAST = 'Hagar fell down'
	Abale higia	Daddy arrive-3SING-MASC-PAST= 'Daddy arrived'
	Yotam yavo	Yotam come-3SING-MASC-FUT = 'Yotam will come'
	ze nishpax	it spill-3SING-MASC-PAST = 'it spilt'
Smadar	*Gaga halax*	Gaga go-SING-MASC-PAST = 'Gaga went'
	kushi omed kaxa	Kushi stand-SING-MASC-PRES thus = 'Kushi is standing like this'
	Benc baxa	Benc cry-3SING-MASC-PAST = 'Benc cried'
	ha-buba roca moceci	the doll want-SINGG-FEM-PRES pacifier-DIM = 'The doll wants a pacifier'
Lior	*ha-pil xole*	the elephant sick-SING-MASC-PRES = 'The elephant is sick'

Figure 2. Examples of early subject-verb sequences with non-agent subjects.

Pattern	*k-t-b*[5]	Gloss
P1 CaCaC	*katav*	'write'
P2 niCCaC	*nixtav*	'be/get written'
P3 CiCeC	*kitev*	'captionize'
P4 hitCaCeC	*hitkatev*	'correspond'
P5 hiCCiC	*hixtiv*	'dictate'

Table 2. Conjugation of the root *k-t-b*[6] in five different verb-patterns. (The capital C's mark the positions of the root consonants in each pattern.)

the same verb-pattern to be used in different syntactic environments, and to mark different predicate-argument relations.

In Hebrew, verbs are based on the integrated constructs of *consonantal root* and *affixal pattern* called *binyan* conjugations. The five major morphological patterns are shown in Table 2 for the root *k-t-b* 'write'[4].

Unlike inflectional morphology, which is associated with the grammar, *binyan* patterns are associated with the lexicon. They manifest the irregularities and accidental gaps typical of derivational morphology. *Binyan* patterns form the basis for morphological marking of predicate-argument relations like transitivity, causativity, passive vs. middle vs. active voice, reflexivity, reciprocality, and inchoativity, so that acquisition of verb syntax and semantics involves command of a fixed set of morphological patterns (Berman 1985, 1993). Thus, VAS alternations at the level of the sentence almost always entail morphological alternation at the level of the verb, marked by a shift in *binyan* assignment. Hebrew-speaking children recognize that the grammar of their language requires morphological marking of argument structure alternations, typically from around age 3, after simple clause structure is established (Berman 1985, 1993). This is illustrated in Figure 3 with data from Leor.

As the figure shows, Leor starts the process of VAS acquisition by using the root *n-p-l* in the P1 pattern to denote the intransitive verb 'fall-down'. Next, he overextends

1. *npl1* ‘fall-down-INTR’	2. *npl1* ‘fall-down-INTR’ used Incorrectly as Causative
nafal [1;10] fall-down-3SING-MASC-PAST ‘fell-down’	*ani epol otax* [2;8] I fall-1SING-FUT you-2SING-FEM ‘I will fall you = I’ll drop you’
nafalti [2;4] fall-down-1SING-PAST ‘(I) fell-down’	*nopel otax* [2;8] fall-SING-MASC-PRES you-2SING-FEM ‘(I) fall you = I drop you’
safta nafla [2;4] grandma fall-down-3SING-FEM-PAST ‘grandma fell-down’	
ani epol [2;4] I fall-down-1SG-FUT ‘I will fall-down’	

3. *npl5* ‘drop’ (Alternates with P1) Used Correctly as Causative
hipalti otax [2;10] drop-1SING-PAST you-2SING-FEM ‘(I) dropped you’
ha-katar hipil ota [2;11] the locomotive drop-3SING-MASC-PAST her ‘The locomotive dropped her’
ani apil lax me-ha-rosh [3;0] I drop-1SING-FUT to-you-2SING-FEM from-the-head ‘I will drop to-you from-the-head = I’ll drop (something) off your head’

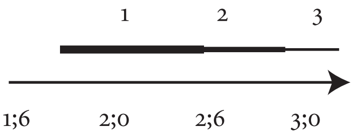

Figure 3. Development of predicate-argument relations through verb-pattern alternations.

the use of *n-p-l* in the P1 pattern to denote the causative action ‘drop’. That is, Leor already knows that in order to form a causative sentence he should use a transitive verb, but he still does not know how to encode causativity through morphology (i.e., by verb-pattern alternations). Subsequently, only around age 3, Leor starts to alternate the familiar P1 pattern, which he initially used with the root *n-p-l*, with the P5 pattern to yield the causative *hipil* ‘drop’. As noted in Berman (1985, 1993), such alternations are first used with a few familiar verbs. Children begin to perceive that a given verb-pattern can be used to express certain general relations only around age 4, indicating that they have abstracted out such notions as causativity as realized through verb-pattern alternations in Hebrew.

2.4. CROSS-LINGUISTIC COMPARISON OF VERB SYNTAX AND SEMANTICS. A comparison between Hebrew and typologically different languages like English and French reveals that the so-called 'general purpose' (Clark 1993) or 'light' verbs (Pinker 1989) in these languages show only partial semantic and syntactic overlap (e.g., differences between Hebrew *la'asot*, French *faire* and English *make/do*). For example, the Hebrew verb *isy1* 'make/do' corresponds to the meanings of both English *do* and *make*, as illustrated in (1)–(2):

(1) *ma ata ose?*
What you-2SING-MASC do-SING-MASC-PRES?
'What are you doing?'
(2) *ani osa migdal*
I make-1SING-FEM-PRES tower
'I'm making a tower'

French, like Hebrew, has a single verb *faire* covering the two English verbs *do* and *make*, but in French this verb also functions syntactically in forming causative constructions, which is not the case for its Hebrew counterpart. Also, these different meanings may be encoded differently in various languages, e.g. causative *make* or French *faire* may be encoded by affixes in other languages. This indicates that target-language features play an important role in early verb acquisition.

2.5. THE ROLE OF INPUT. Proponents of the integrative view emphasize the role of input in the acquisition of verbs and VAS, arguing that input is a good predictor of verb use, and that it guides the choice of argument structures and complement-types initially used by children with specific verbs (Clark 1995 and DeVilliers 1985). Evidence from the acquisition of two bitransitive verbs—*bwa5* 'bring' and *ntn1* 'give'—supports this claim.

Hebrew allows relatively free fronting of dative or oblique objects to precede the direct object. Thus, sentences (3) and (4) are equally well formed, depending on what is taken as background and what as new or more dominant information (Erteschick-Shir 1979, Hopper & Thompson 1980).

(3) *ima natna [**le-Ruti**] [**et ha-buba**]*
Mommy give-3SING-FEM-PAST to-Ruti ACC the-doll
Mommy gave Ruti the doll
(4) *ima natna [**et ha-buba**] [**le-Ruti**]*
Mommy give-3SING-FEM-PAST ACC the-doll to-Ruti
Mommy gave the doll to Ruti

Analysis of input and production data pertaining to the acquisition of *give* and *bring* at the single argument phase (MLU-W range 1;5–2;5) reveals that input affects both the order of argument acquisition, and the position of arguments in relation to each other within the clause[8]. Figure 4 compares the distribution of argument structure configurations in input to Hagar and in the girl's production of the two verbs.

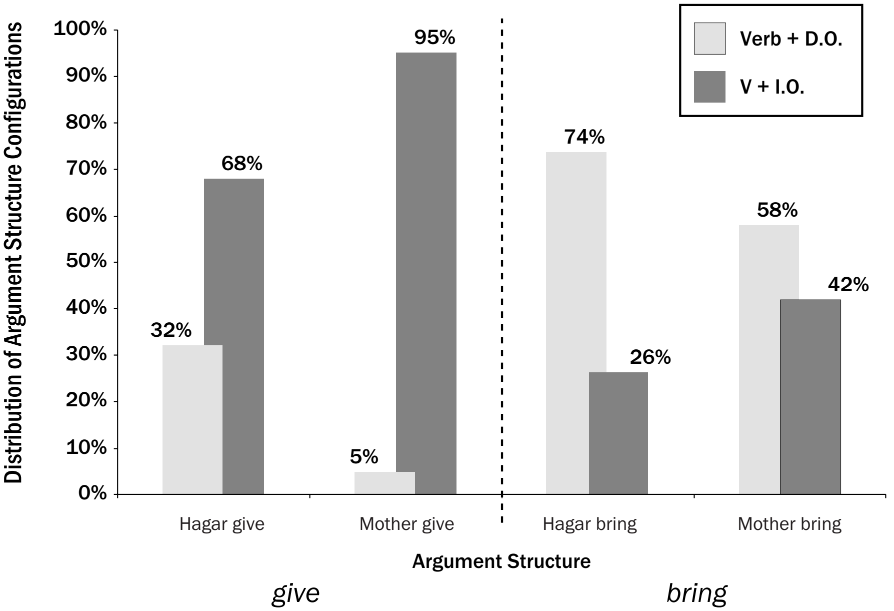

Figure 4. Distribution of argument structure configurations in the acquisition of two verbs. The dark bars represent the percentage of verb+indirect-object sequences, and the light bars the percentage of verb+direct-object sequences. The two left pairs of bars relate to input and production of *give*, while the two right pairs relate to input and production of *bring*.

Figure 4 indicates that despite the fact that both verbs have the same argument structure (subject, direct object, indirect object), each is initially acquired with a different argument. The verb *bring* is initially acquired with the direct object, while the verb *give* with the indirect object. This pattern matches parental input of the two verbs.

4. DISCUSSION. All theories of the syntax-lexicon interface assume that there is a correlation between the meaning of a verb and the syntactic structures in which it appears. However, there is disagreement among researchers on the type of lexical information listed in the lexicon, and the nature of the system responsible for its mapping into syntax. In this paper, I used evidence from the acquisition of Hebrew to argue for the integrative view to the lexicon-syntax interface. In this view, it is lexical information that initially drives syntax in the sense that argument structures are acquired through experience with individual verbs, and not through early mediation of an innate mapping system.

I have shown that initially, certain verb argument configurations are learned in isolation, and that children do not generalize from one verb to another, even when two verbs have the same argument structure like *give* and *bring*. The initial choice of arguments is determined by input, and by pragmatic factors such as new versus old information. For example, the verb *give* is usually used when the child and caretaker interact, and one is holding an object that the other wants. Since both child and caretaker usually see the requested object, it is the recipient of the object that is more likely to constitute new information. In Hebrew, the recipient of a bitransitive verb is marked by the indirect object. Therefore, it is most likely that the initial argument to be used with give would be the indirect object. With *bring*, the object to be transferred is out of sight, and therefore it is most likely to constitute new information. Since the transferred object, (or theme), is usually marked in Hebrew by the direct object, this argument will be the first to occur with *bring*.

I also demonstrated the role of language typology in the acquisition of VAS. The importance of language typology is further supported by research in other areas of acquisition like novel verb coinages (Clark 1993). Also, it was shown that verb syntax and semantics do not completely overlap cross-linguistically, so that a universal linking mechanism cannot equally account for acquisition of predicate-argument relations across languages. I discussed evidence against early application of the proposed canonical mapping: I have shown that verbs which violate this mapping scheme are acquired early and with no errors. Evidence from English further supports these findings (Bowerman 1990). This suggests that canonical mapping may not be universal, and that different languages may have different canonical mapping schemes. As a result, the relevant mapping scheme might take longer to learn, and therefore, might not be used as the initial strategy for the acquisition of predicate-argument relations. This is in line with the fact that Hebrew-speaking children generalize predicate-argument relations only at around age 4.

In view of that, acquisition of predicate-argument relations is assumed to be data based and cumulative. Initially, children are assumed to experience with individual verbs. Then, each verb is used with multiple noun phrases in a particular syntactic position, e.g. direct object position. Later, children add more complement-types to each verb, and subsequently, they generalize particular structures to whole classes of verbs.

5. CONCLUSION. The evidence presented here supports the integrative view to the lexicon-syntax interface. However, additional research is required to fully establish the claims made in this paper. Relevant topics may include the effects of null-arguments on the acquisition of predicate-argument relations, or the acquisition of special verb-classes, e.g., psych-verbs. Research on typologically different languages, and data elicited with different experimental methods may also shed light on the lexicon-syntax interface. Methodologically, it might be worth while to compile reference lists of language-specific meta-argument structures, preferably on the basis of distributional analyses of adult spontaneous speech samples.

[1] MLU-W refers to the calculation of Mean Length of Utterance in Words rather than morphemes.

[2] I use the term *configuration* to refer to the realization of partial argument structures. For example, the verb *give* subcategorizes for three arguments: a subject, a direct object and an indirect object, (e.g., Dan gave the book to Rina). However, not all of the verb's arguments may be realized in discourse (e.g., give the book to Rina!). The combination of a verb with only part of its arguments is referred to as *verb-argument configuration*.

[3] The following abbreviations are used in this paper: MOT – mother, LIO – Lior, HAG – Hagar, SING—singular, FEM – feminine, MASC – masculine; PRES – present, FUT – future, PAST – past, IMP—imperative, 1,2,3 – first, second and third person, ACC – accusative; DIM – diminutive, TRANS – transitive, INTR – intransitive.

[4] I do not deal here with the two strictly passive verb-patterns *pu'al*, which corresponds to the active P3 pattern *pi'el,* and *hof'al*, which corresponds to the P5 pattern *hif'il*, because they are largely absent from and/or irrelevant to early child language (Berman 1993b).

[5] The stops /k/and /b/ alternate with the spirants /x/ and /v/ in various morphological contexts.

[6] Verbs are presented in the morphologically unmarked form of 3rd person, masculine, singular in the past tense.

[7] In this paper, lexemes are represented as combinations of verb-roots and verb-patterns (marked by a number), e.g., *isy1* is made-up of the root *isy* and the P1 pattern marked by '1'.

[8] For purposes of illustration, I use data from Hagar. Similar trends were found in the data of the three other children.

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❧

LEXICAL DEVICES AND THE CONSTRUCTION OF OBJECTS: A COMPARISON BETWEEN SENSORY MODES

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In the cognitive sciences[1], the debate on relativism versus universalism has recently been revived, with another round of attention given the important domain of color. The universalist hypotheses developed in the field of linguistics have been linked with psychological research (notably by Berlin *&* Kay 1969 and Rosch-Heider 1971), grounding lexical semantics in cognitive representations. However, most of the work has been done, (i) with severely restricted linguistic material, such as isolated, lexicalized terms derived from such specific production situations as list enumeration (e.g., the seven criteria of Berlin and Kay's (1969) 'basic terms'), and, (ii) with visual representations that produce the illusion of words mapped onto objects and their cognitive representations (Dubois 1997a, Dubois *&* Grinevald 2000).

Our contribution goes to the heart of this debate. We focus on three points:

1. investigations into the *relationship between words and representations* in other sensory modes (olfaction, taste, audition).
2. broadening these investigations to include different types of linguistic corpora (in this case, definitions, listings), *considered as discourses* (Benveniste 1966);
3. going further to take into account the *diversity of linguistic devices provided by language in discourse,* that is, expressions which enable reference to perceptual objects (denominations and designations[2]), as well as expressions that introduce these 'objects' into the discourses of the subjects[3].

The lack of *a priori* established and named odor categories made it impossible to apply Berlin & Kay and Rosch-Heider's paradigms to our studies of the olfactory field. Our work, which includes variations of several types of experiments within a multidisciplinary program, has shown that cognitive categories for odors can be identified, even if there is no consensus as to their verbal designations (for example, Engen 1987, Rouby *&* Sicard 1997, and Dubois 1997a). This has in turn produced a broad diversity of expressions in which the subjects' involvement could be observed.

Several types of linguistic devices have been explored, including deverbal adjectives, person marking and modal and defining expressions. It is worth noting that (i) our conclusions are buttressed by the convergence of the results of the analyses rather than by each of the individual points taken in isolation, and (ii) in discourse analysis, what is significant is the contrast between different discourses (here

Corpus-Def	
Part I: Subjects' definition framing	*For me*, a smell is something which floats in the air. (smell, 1–133)
Part II: Definition	For me, *a smell is something which floats in the air*. (smell, 1–133)
Part IIIa: Example	For example, *a sweet* or *a salty smell* (smell, 1–33)
Part IIIb: Comments about the ex.	*Among the smells I prefer* it's the spring one. (smell, 1–13)
Corpus-Enum	
Part I: Subjects' enumeration framing	*The smells that I memorize first* are smells of the street. (smell, 1–178)
Part IIa: Listing	The smells that I memorize first are *smells of the street.* (smell, 1–178)
Part IIb: Comments about the ex.	[…] Neutral ones […] (*we are accustomed to them and we notice them only when paying attention*). (smell, 1–182)

Table 1. Structure of the answers.

induced by *odeur* 'smell', *saveur* 'flavor', *bruit* 'noise' and *son* 'sound'). The results enable us to develop new hypotheses concerning the role of linguistic resources in the construction of objectivity.

1. THE CORPUS AND ITS ANALYSIS. The corpus consists of the subjects' answers to the two following questions (there were 246 subjects for 'smell', 276 for 'flavor', 183 for 'noise', 194 for 'sound')[4].

Definition (Corpus-Def)
'According to you what is a smell / a noise / a sound / a flavor?'
Enumeration (Corpus-Enum)
'What types of smells / noises / sounds do you identify in your environment?'
'What types of flavors do you identify?'

The analysis of the answers has been structured as follows (see Table 1). **Corpus-Def** has been given a three-part structure: Part I, the subjects' definition framing, i.e., statements that express their attitude about their definitions; Part II, the definitions themselves; Part III, examples and comments about them. **Corpus-Enum** is in two parts: Part I, the subjects' enumeration framing, i.e., statements that express their attitude about their listing; Part II, the listing of examples and comments about them

This structuration takes into account the inferences that can be drawn from the fact that linguistic devices differ according to their position in the discourse. For example, the same pronoun will not lead to the same inference should it echo some wording of the question ('according to you/for me') or be directly introduced into the subject's predication.

2. DEVERBAL ADJECTIVES. The designations given by the subjects in their definitions and listings of 'smell' are highly diverse and the [*odeur* + adjective] structure occurs frequently (see David et al. 1997). Among the adjectival forms, only deverbal constructions will be considered here. These constructions fall into two classes: adjectival forms using *-ble*, such as *agréa**ble*** 'pleasant' and *nuisi**ble*** 'noxious', and adjectival forms using *-ant*, such as *plais**ant*** 'pleasant' and *piqu**ant*** 'pungent'.

Adjectives in *-ble* are the most frequent as occurrences:

(1)	*agréable*	*désagréable*	*insoutenable*	*insupportable*	*nuisible*
	pleasant	unpleasant	unendurable	unbearable	noxious

They represent a quasi-homogeneous class (according to the contrasts proposed by Anscombre & Leeman 1994) and can be interpreted as a non-processive and intrinsic characteristic of the entity described, this latter being interpreted as non-agentive.

Adjectives in *-ant* are the most frequent as types:

(2)	*alléchant*	*déplaisant*	*écœurant*	*envahissant*	*gênant*	*piquant*
	mouth-watering	unpleasant	disgusting	pervasive	disturbing	pungent
	plaisant	*polluant*	*réconfortant*	*repoussant*	*répugnant*	*suffocant*
	pleasant	polluting	comforting	repulsive	disgusting	suffocating

These verbs represent a homogeneous class as far as the syntactic properties of the verbs are concerned, i.e., they are transitive, their subject can be the noun 'smell', and their complement can be interpreted as human. They can be reformulated as *qui V*, 'which V', as in e.g., *une odeur gênante* 'a disturbing smell', meaning *une odeur qui (me/nous) gêne (quelqu'un)* 'a smell that disturbs (me/us/someone)'. And, following Kupferman (1992) or Fradin (1997), the noun that the adjective qualifies is interpreted as non-agentive.

This latter class is interesting in that it converges with other hypotheses regarding the cognitive representation of hedonic judgment (frequently observed in olfaction). On the basis of their linguistic form, adjectives in *-ant* can be interpreted as the consequence of the process denoted by the verb. This suggests that these constructions may denote an effect, i.e., the manifestation of a phenomenon implying an oriented relationship between an entity in the world and a subject (Augoyard & Torgue 1995). Such an interpretation derives support from two further results.

First, the frequency of occurrence of designations of smell based on an hedonic property (Table 2, overleaf), compared to those designations based on source property (expressions that denote the source, such as 'a lemon smell') and physical property (expressions that denote measurable phenomena (intensity, duration, level, acidity, etc.))[5].

Hedonic property		Source property		Physical property	
smell	70.0 %	flavor	89.5 %	flavor	53.0 %
noise	28.0 %	noise	70.5 %	sound	45.5 %
sound	24.5 %	sound	52.0 %	noise	16.5 %
flavor	20.0 %	smell	46.5 %	smell	8.0 %

Table 2. Corpus-Enum.

	Nb. of answers with at least one PERS	Nb. of answers	%
Smell	145	246	59
Flavor	107	276	39
Noise	69	183	38
Sound	58	194	30

Table 3. Corpus-Def[6].

(3) a. The pleasant vs. unpleasant association **depends upon the person, his/her culture** […] (smell, 1–8)
b. [A smell] can be good or bad, **depending upon one's appreciation**. (smell, 1–86)

(4) a. A sound which is disturbing, irritating, **which can become unbearable**. (noise, 3–40)
b. The noise unnerves **when it reaches a certain level and when it has a certain duration** (noise, 3–98)

3. PERSON MARKING. 'Natural definitions' differ from lexicographic or scientific definitions in their inclusion of person markings (PERS), i.e., the use of personal pronouns and possessives (see Ouellet 1984, Riegel 1990). Here, these PERS are analyzed as linguistic cues to evaluate the subjects' involvement in their discourse (Souchard 1989, Souchard et al. 1998). Our analysis notes the quantification of PERS vs. its absence and the division of PERS into a contrast between individual and collective PERS[7] (David 1997).

First, if we consider the number of answers that include at least one PERS, definitions of 'smell' contrast with others, as shown in Table 3. Thus, representations related to smell are linguistically expressed in a more subjective manner. Such a result is further confirmed by the analysis of the similar distribution of Part II (the definition itself).

Secondly, in Part IIa of Corpus-Enum (the listing), the number of designations that include individual PERS is highest for 'smell', as shown in Table 4; that is, utterances such as (5) are more frequent than utterances such as (6):

	Interpretation	**Nb. of PERS**	**Repartition collective/ individual (%)**
Smell	Collective	9	41
(22 occurrences)	Individual	13	59
Flavor	Collective	10	59
(17 occurrences)	Individual	7	41
Noise	Collective	13	62
(21 occurrences)	Individual	8	8
Sound	Collective	12	80
(15 occurrences)	Individual	3	20

Table 4. Corpus-Enum (Part IIa).

(5) a. [The smell] of **my** dog, of the after-shave of **my** husband, of one of **my** mother's cakes (smell, 1–82)
b. […]**my** own smells, the smells of **my** surroundings […] (smell, 1–85)
(6) a. There are smells **we** are attracted to and smells **we** are disgusted by (smell, 1–51)

The frequency distribution of PERS in the corpora suggests that one can differentiate between an objective/subjective contrast and an individual/shared contrast. PERS indicate subjective representations, and where there is a lack of PERS, we can infer an objective (or more objective) representation. From the combined analysis of deverbal constructions and PERS, we can conclude that the olfactory domain is more subjective and individual than the domains of audition and taste.

The subjective and individual characterization of representations in the olfactory domain will be further confirmed when other forms, such as the expression of modality and defining terms, are taken into account.

4. THE EXPRESSION OF MODALITY. Listings of 'smell' differ greatly from those of the other three corpora in that Part I occurs much more frequently in this domain, as shown in Table 5 (overleaf). In olfaction especially, subjects are more cautious when they enumerate types of smells, (7), as can be observed if we contrast the listings of types of flavors and types of sounds (in which adjectives or nouns are directly produced), (8). For example:

(7) a. **I classify smells of my environment like this**: the smells of my environment (smells of the country), my own smells, the smells of my surroundings, the smells of the city. (smell, 1–85)
b. **We generally distinguish two types of smells**, pleasant and unpleasant: cooking, perfume, spring; sweat, perfume. (smell, 1–107)

	Nb. of answers with Part I (framing)	Nb. of answers	%
Smell	105	245	43
Flavor	39	275	14
Noise	35	182	19
Sound	26	193	13.5

Table 5. Corpus-Enum.

	Nb. of answers with at least one exp. denoting uncertainty	Nb. of answers	%
Smell	31	245	12.5
Flavor	14	275	5
Noise	7	182	4
Sound	5	193	2.5

Table 6. Corpus-Enum (Part I: framing).

c. **There are** fruity smells, food smells, fresh smells, stuffy smells, natural smells (smell, 1–119)

(8) a. Salty, sweet, bitter, acid. (flavor, 6–38)
b. High or low; pleasant or unpleasant. (sound, 4–28)

In the listing of smells, the expression of modality, mainly referring to uncertainty (David 2000a), is more frequent than in the other corpora, e.g., *pouvoir* 'can', with an epistemic interpretation (i.e., *Jean peut partir* means 'It may happen that John leaves'; Sueur 1979, Fuchs 1989); adverbs denoting uncertainty such as *peut-être* 'maybe'; conditional forms; adjectives suffixed by *-ble* which imply an interpretation related to the verb *pouvoir*, as with *identifiable* 'identifiable' (Anscombre & Leeman 1994). Table 6 shows the distribution of these expressions (exp.), with example (9):

(9) a. In our environment, **one can maybe distinguish smells** within three categories: those which are pleasant, unpleasant, and those which are rather neutral (**even if they do not exist**, for instance any neutral smell). (sound, 0–18)
b. One can distinguish smells that refer to traces of the past experience, or, on the contrary, new smells that one does not know. One can also classify smells as pleasant or not. (sound, 1–215)

Subjects often manage to convey that they are talking about their own experience and that the types they distinguish may be different. In most cases, the pronoun

	Nb. of occurrences 'something' + 'what'	Nb. Of occurrences defining exp.	%
Smell	105	323	32.5
Flavor	49	382	13
Noise	52	220	23.5
Sound	36	234	15.5

Table 7. Corpus-Def.

associated with the verb of modality can be interpreted as collective. Therefore, although this uncertainty reveals that there is no consensus or shared negotiation within subjects' productions owing to the paucity of lexicalized expressions, this lack of consensus can also be understood as part of the knowledge about smells.

5. THE DEFINING EXPRESSION. In Corpus-Def, we can observe a variety of defining expressions, among them: hyperonyms, synonyms, and expressions such as *quelque chose* + *qui/que* 'something + which' and *ce que/qui* 'what', which show that the term to be defined is not classified within a taxonomy (Kleiber 1987, Kleiber *&* Tamba 1990). For example:

(10) a. A smell is something one can smell. (smell, 1–192)
b. A flavor is something which you cannot touch. (flavor, 6–10)
c. What emerges from silence. (noise, 2–4)
d. What is heard thanks to one's hearing. (sound, 5–31)

The general nature of such expressions also reveals a relative indetermination on the part of subjects with regard to their own knowledge. See the distribution of these forms in Table 7.

'Something' and 'what' occur very frequently in definitions of 'smell', in contrast to their occurrence in definitions of 'flavor' and 'sound'. 'Smell' is first defined as 'something', whereas 'flavor' is defined as a taste, 'noise' as a sound, and 'sound' as a noise (indicating that there is no simple hyperonymic relationship between these two latter terms). This, again, may result from the lack of lexicalization even if it points to other properties of smells, such as, for example, their immateriality (Strawson 1973).

6. CONCLUSION. Our analysis of the productions of definitions and type listings for sensory representations by French speakers brings out the the following: (i) the high frequency of deverbal adjectival constructions for smells; (ii) the presence, even in definitions, of forms denoting the subject's involvement in olfaction, taste and audition is most clearly marked with regard to smells; (iii) the higher frequency of expressions denoting uncertainty or indetermination with regard to smells than

with regard to the other senses studied, and, (iv) this uncertainty is shared and can be viewed as a part of people's knowledge about smells.

Comparison of these different corpora enables us to conclude that the construction of 'objects' in the world on the basis of the different sensory modes operates not only in reference to the world itself but also as a shared intersubjectivity that is created via the meaning of lexicalized forms. The lack or quasi-lack of lexicalized terms leads to representations in which the subject expresses her/his involvement in two different ways, i.e., by presenting him/herself either as an individual among others or as someone unique and distinct from all other individuals. Therefore, in addition to objective representations (collective constructions, appropriated by each subject) we find the following:

i. **Subjective** ***and unshared*** **representations**, which are elaborated by subjects in their singularities, communicated through the uncertainty and indetermination of their linguistic expressions (primarily expressed by first-person and singular PERS and/or modalities);
ii. **Subjective** ***but shared*** **representations**, which are elaborated individually but are acknowledged to be shared experience (primarily expressed by collective PERS and/or modalities).

If people always perceive 'something' through the diversity of their senses, language objectivizes and 'stabilizes' cognitive representations of the world by means of a large variety of linguistic forms. In our approach, we view language as an element of constraint and as creating a variety of distances and 'cuts' between a 'subject' and 'objects' of the world. We therefore consider the point at which words 'map onto things' as the endpoint of a process of objectivization that ranges from complex locutions to simple 'basic' names. We view the drastic lack of lexicalization documented by our linguistic analysis as suggesting that smells that have no name cannot be considered as standing out there in the world as 'objects', ready to be perceived and processed. Meanwhile, psychological research has shown that, even without such basic names, subjects do nevertheless elaborate categories of smells (Rouby & Sicard 1997).

The argument for grounding the semantics of 'basic terms' in the mapping of 'labels' on cognitive categories derived from some universal, cognitive, 'bottom-up' process would therefore need to be reconsidered in the fields of linguistics, psychology and history: the 'basic term'—as a simple and lexicalized word for a perceptual phenomenon—would actually derive from a collective process of abstraction rather than from some 'direct', primitive perceptual process. Objectivity would thus be the complex result of a variety of psychological, psycholinguistic and linguistic processes. We derived this construction of objectivity from the diversity of the linguistic forms that result from various processes of grammaticalization, and particularly of lexicalization.

In conclusion, a more precise analysis of linguistic devices extended to languages other than French is therefore necessary to confirm our results and to contribute to the elaboration of a formal model of the relationships between language and cognition. One would expect that such a program would help to solve the contradictions and polemics raised by the universalist/relativist debate.

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[1] We thank R. Panckhurst and C. Grinevald for having read this text.

[2] The term 'designation' is used to identify unlexicalized expressions; 'denomination' is used to identify lexicalized expressions (see e.g. Kleiber 1984, Corbin & Temple 1994).

[3] Our investigation concerns the French language, but see also Boisson (1997) for investigations into the naming of smells in 60 languages (representing 9 language families); re: evidentials, see Camargo (1996) for Caxinaua (Pano family) and Mennecier & Robbe (1996) for Tunumiisut (an Inuit language).

[4] The questions were drawn up under the aegis of the multidisciplinary research framework supported by the CNRS Cognisciences program ('Categorization').

[5] These three properties permit classification of more than 90% of the answers. An answer can refer to different properties. Thus, in Table 5, for any given term the sum of the percentages (calculated in relation to the number of subjects) is more than 100.

[6] In this paper, percentages are rounded off to a half point.

[7] On the one hand, we have PERS: *on*, *nous* "we', *vous* 'you' (but also *notre* 'our', *votre* 'your', *nos* 'our', etc.), and, on the other hand, *je* 'I' (and also *mon*, *mes* 'my', etc.). The distribution between 'collective' and 'individual' may appear simplistic given that considerable research indicates that the individual/collective interpretation does not square with the singular/plural (cf. for example Benveniste 1966, Atlani 1984, Boutet 1986, Mazière 1994). These corpora are not as complex since (i) the interlocutor is never mentioned (*vous* 'you' does not denote the interlocutor but rather a group from which the speaker excludes him/herself); (ii) *on*, *nous*, *vous* (and associated forms) always have a collective interpretation even if the extension of this group is often underspecified.

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DENOMINATIONS OF COLORS IN PRACTICES

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This paper is an exploration of the relations holding between language and cognition within the context of cognitive research on the categorization of the 'objects' of the world and their denomination. It does so through the study of the denomination of colors in different practices, in the French language. The paradigm established for this domain by Berlin and Kay (1969) aimed at validating universalist positions which assign cognitive motivations to lexical meanings.

Dubois (1991) and Dubois, Resche-Rigon and Tenin (1997) have already shown the limits of such an approach, on the basis that:

a. it reduces language and lexicon to a mere nomenclature;
b. it assimilates what is a socialized knowledge reproduced in the color chart of the Munsell company to perceptually based representations; and
c. it hypothesizes the existence of a fit between lexical items and entities of the world (conceived essentially as visual), where both words and entities are taken to be *a priori* discrete.

This hypothesized 'mapping' of names of colors onto the 'focal' colors reproduced in the color chart fits within an experimental paradigm from which we depart. The criticism we address to this approach is that it locks the subjects of the experiment, on one hand, within a very particular conceptualization of the domain of color (the one given by the unified theory of light), and, on the other hand, within a theory of language taken to be a repertoire of labels mapping onto things (see Dubois, Resche-Rigon & Tenin 1997 for a discussion of this point).

Criticism from within linguistics had already been formulated, particularly from intercultural research (Lucy 1996 and Foley 1997 among others); what was questioned, among other things, was the reduction of the process of denomination of colored phenomena to basic terms which are independent of the contexts of use.

Criticism from a 'cognitive' point of view (not necessarily identified as such), came from a number of ethnolinguistic and psychological research projects (Thomas 1989, Guedou & Coninck 1986, Meyerson 1957 and, more recently, Saunders & van Brakel 1997), challenging the hypothesized universal character of the abstraction of the concept of color.

This internal criticism of the reductive character of the Berlin and Kay paradigm converges with the results of psychological and linguistic empirical research which has been developed in the olfactory and auditory domains (Dubois, Rouby &

Sicard 1997, Dubois & Rouby 1997, David et al. 1997, Dubois 2000, and David, Dubois & Rouby this volume). This research has led us to consider that 'objects' of the world, as well as their lexical forms, were in fact the result of a complex construction of an objectivity, which is based on cognitive processes such as categorization, and on linguistic processes such as lexicalization.

Our working hypothesis is that, in order to understand these complex psychological and linguistic processes, one cannot reduce subjects to 'information processing systems' operating in a pre-categorized and pre-labelled contemplative world. Instead, one must think of them as actors and producers of categories and language forms which are adapted to their practices[1].

Our perspective is based on the obvious diversity of types of knowledge required for and constructed from these practices, and it focuses on the search for constraints on the diversity of linguistic expressions rather than for the universality of basic terms. It takes the construction of the abstraction of the notion of color as knowledge which has emerged from culturally specific practices, in this case of theorizing of the physics of light, and its modelling in a material way—and most likely 'faithful' way—in the type of color chart produced by the Munsell company. Hence the idea of a research project for the study of the denominations of colors in two different practices, and our proposed analysis of color charts used for the sale of artistic paint (oil and watercolor) and decorative wall paint (satiny and shiny gloss paints)[2].

2. STUDY MATERIAL: ARTISTIC AND DECORATIVE COLOR CHARTS. The advantage of the kind of material used is that it resembles the Munsell color chart, in that the color blocks of the sale material found in drugstores or art supply stores are distributed on a spectrum that passes progressively from one color to another (with some discontinuities). These color charts are different from the Munsell chart, however, on at least three counts that seem interesting for our purpose:

a. their ultimate *raison d'être* is not to reproduce all colors through color chips, but to present a repertoire of products available for sale within two different practices: the artistic one is to offer 'basic' colors to be mixed in order to produce other 'colors', while the decorative one is for home improvement, i.e. to offer ready made colors for immediate use.
b. the nature of the material itself which integrates into the notion of color other characteristics than the three parameters of the Munsell color chart (hue, intensity, saturation), such as oil paint vs watercolor for the artistic paint, or shiny vs satiny gloss paint for the decorative paint.
c. the association of a denomination with each color chip.

The material selected for the study includes four color charts for artistic paint (two brands of oil paint, *Sennelier* and *Blockx*, and two brands of watercolor, *Sennelier* and *Schlincke*, and four charts for decorative paint from two different

Artistic	*N total =*	*355*	**Decorative**	*N. total =*	*169*
	oil	watercolor		shiny	satiny
Sennelier	108	81	*Avi*	37	34
Blockx	56		*Valentine*	51	47
Schmincke		110			

Table 1. Number of named blocks in each chart.

brands, *Avi* and *Valentine*, each one in shiny and satiny varieties). These color charts contain different numbers of named color blocks (see Table 1), these color names constituting our data base.

3. DIFFERENCES IN THE USE OF 'BASIC' TERMS IN THE TWO PRACTICES. Our first point is to consider the relevance of the notion of basic term for the corpus we are studying. A 'basic term' (Berlin & Kay 1969:6) is a form which exhibits minimally the following four characteristics:

a. It is monolexemic; that is its meaning is not predictable from the meaning of its parts.
b. Its signification is not included in that of any other color term.
c. Its application must not be restricted to a narrow class of objects.
d. It must be psychologically salient for informants.

The eleven 'basic' terms of French therefore are (in the order of their hypothetical genetic anteriority based on the English study):

> *blanc/noir/rouge/jaune/vert/bleu/brun/orange/gris/violet/rose*[3]
> white/black/red/yellow/green/blue/brown/orange/grey/purple/pink

3.1. OCCURRENCES OF 'BASIC TERMS' IN BOTH PRACTICES. The first difference between the color charts of the two practices holds when we count the 'basic terms' in the sense of Berlin and Kay: the basic terms never occur by themselves in the artistic color charts, and they occur only in 14% in the decorative ones. The second difference is that all 'basic terms' (monolexemic and part of polylexemic constructions) occur in 83% of the labels for artistic paints, but in 58% of those for decorative paints[4], which is in a reverse proportion of the monolexemic basic terms (as defined above).

3.2. DISTRIBUTION OF 'BASIC TERMS' ACROSS COLORS IN THE TWO PRACTICES. The most frequent basic color names (occurrences within brackets) are for artistic paints, *yellow* (22), *green* (18) and *red* (15), *blue* (13), but for decorative paints, *green* (23), *blue* (19), *pink* (12) and *yellow* (10).

The less frequent colors are *white* (2) and *grey* (2) for artistic paints, and *orange* (2) and *purple* (0), for decorative paints.

The 'basicness' of the colors calculated on the basis of their occurrence frequency points to two kinds of diversity: first, the relative frequency of the color terms does not correspond to what the Berlin and Kay's hypothesis might lead us to expect, in either artistic or decorative sets. Second, the relative frequency of the color terms is different in the two kinds of color charts. Again, the Berlin and Kay's hypothesis would not predict any relativity or variation of this kind.

Therefore, the analysis of the occurrences of the 'basic terms', whether in the narrow monolexemic sense or in the wider polylexemic sense, does not support the hypothesis of a fit between these linguistic forms and 'basic categories' distributed on the color charts studied. The focal or basic colors which match the basic terms are not the ones which correspond to the hypothetical universals of the segmentation of the color spectrum identified by Berlin and Kay. The colors that could be considered as focal in the color charts vary with the different sale practices of the two types of color paints. The denomination of the color blocks is therefore not simply a question of direct reference to the color (where color is reduced to the three parameters of the Munsell color chart), but takes also into account partly the material itself but mostly the ultimate goal of the sale of commercial products.

To the extent that the study of 'basic terms' is far from exhausting that of the processes of denomination of colors, we will analyze next the diversity of the forms associated with the color blocks in the two types of color charts.

4. DIFFERENCES IN THE DENOMINATIONS OF COLORS IN THE TWO PRACTICES

4.1. NON-BASIC MONOLEXEMIC DENOMINATIONS BY PRACTICES AND BY BRAND. The monolexemic denominations other than the 'basic terms' already mentioned are very infrequent for artistic paints (14 occurrences out of 355 color blocks in all four color charts, that is 4%!), with very little variation between brands and materials. On the other hand, with decorative paints, monolexemic non-basic term designations represent 42 out of 169 color blocks (25%), with a clear contrast between the brands: the lexical wealth of *Valentine* (Val) with 34 occurrences, independent of material (16 shiny and 18 satiny), contrasts with the reduced number in the *Avi* brand (6 + 2 = 8). This linguistic variability seems to depend entirely on the marketing policies of the specific brands (see Table 2).

4.2. THE DIVERSITY OF LEXICAL CONSTRUCTIONS ACROSS PRACTICES. The analysis of the syntactic constructions of the polylexemic forms which has been done for the three colors: *rouge* 'red', *bleu* 'blue' and *vert* 'green' (Moulin 1997, see Table 3) shows the following variations:

- for artistic paints, 22 different constructions were identified, which vary in the number of elements (2 to 5), and in the types of grammatical categories and of syntactic constructions involved.

artistic	*Huile Bl.*	*Huile Sen.*	*Aqua Sen.*	*Aqua Sc.*
	3	*2*	*3*	*6*
decorative	*Avi Bril.*	*Val Bril.*	*Avi Satin*	*Val Satin*
	6	*16*	*2*	*18*

Table 2. Monolexemic designations other than 'basic terms'.

artistic charts	
1. vert Fragonard	Ct+ proper Noun
2. bleu montagne	Ct+ common Noun
3. cadmium rouge	N + Ct
4. rouge écarlate	Ct+ adjective
5. terre verte	N + adjective
6. rouge corail Hélios	Ct+ common Noun + proper Noun
7. vert Véronèse substitut	Ct+ proper Noun + commun Noun
8. bleu cobalt imitation	Ct + common Noun+ commun Noun
9. rouge cadmium clair	Ct + common Noun+ adjective
10. vert anglais moyen	Ct+ adjective+ adjective
11. laque outremer foncé	N + Ct+ adjective
12. ton rouge de Saturne	N + Ct+ prep + proper Noun
13. teinte bleue de cobalt	N + Ct + prep + common Noun
14. bleu de Paris	Ct + prep + proper Noun
15. bleu de manganèse	Ct + prep + common Noun
16. vert oxyde de chrome	Ct+ common Noun+ prep + commun Noun
17. rouge vermillon de Chine	Ct+ common Noun (Tc ?) + prep + proper Noun
18. laque vert d'Orient	N + Ct + prep + proper Noun
19. vert de Chine clair	Ct + prep + proper Noun + adjective
20. laque d'alizarine rouge	N + prep + common Noun+ Ct
21. ton rouge de cadmium clair	N + Ct + prep + common Noun+ adjective
22. rouge de cadmium clair véritable	Ct+ prep+ common Noun+ adjective+ adjective
decorative charts	
1. vert Provence	Ct + proper Noun
2. rouge signal	Ct + common Noun
3. vert foncé	Ct + adjective
4. vert d'eau	Ct + prep + common Noun

Table 3. Lists of lexical constructions in the two types of charts (Ct = Color term).

- meanwhile, for decorative paints, only 4 different constructions were observed, with a maximal construction of 3 elements that is rarely encountered.

The four constructions found in the decorative paints are also found in the artistic paints, but with different frequencies of use, rather consistent over the various

Paint charts	artistic	decorative
Ct+ common Noun	12 %	**48 %**
Ct + adjective	8 %	**33 %**
Ct+ proper Noun	5 %	7 %
Ct+ prep + common Noun	8 %	4 %

Table 4. Lexical constructions shared by the 2 types of charts.

a. decorative charts		
- typical **source**		
concrete object	*bleu canard, vert pomme*	**35 %**
symbolic object	*rouge signal*	**15 %**
- intensity	*vert foncé, bleu pâle*	25 %
- location	*rouge basque, bleu breton*	25 %
b. artistic charts		
- source	*rouge rubis*	2 %
- **pigment** source	*rouge au cadmium clair,* *vert oxyde de chrome*	**28 %**
- **pigment** property	*extra fin, véritable, pur*	7 %
- intensity	*vert anglais extra clair*	14 %
- location of source	*rouge vermillon de Chine, laque vert d'Orient*	8 %
- person or character	*vert Véronèse, rouge Hélios*	3 %
- brand name	*rouge Sennelier*	1 %

Table 5. Semantic interpretation of the denominations.

brends and colors. The simpler construction of [color term + simple lexical term (adjective or common noun)] represents more than 80% of the polylexical forms for decorative colors, but only 20% of the designations in artistic color charts (Table 4).

The modes of construction of the denomination of the color blocks vary therefore not so much according to the material characteristic of the colors presented in the color charts but rather according to the practices associated with them.

4.3. THE SEMANTICS OF THE LEXICAL FORMS IN THE TWO PRACTICES. The analysis of the semantics of the denominations reveals another contrast between the decorative and the artistic color charts (see Table 5). In the decorative color charts

(Table 5a), the non-basic monolexemic forms evoke in the majority sources, i.e. concrete objects the color of which is considered typical for the nuance (*prune* 'plum', *jonquille* 'daffodil', *sable* 'sand', *liège* 'cork'...) and the polylexemic forms are also built on the name of sources which are typically associated with the color terms (*bleu canard,* lit. 'duck blue'…). In the artistic color charts (Table 5b), the polylexical forms (which include or not a basic term and which are characteristic of the denominations found in the color charts of this practice) exhibit a greater semantic variety than those of the decorative color charts.

Only four semantic principles were identified in the denominations of the decorative color charts, which are also found in the artistic color charts, but with different frequency of use. For instance, denominations referring to objects with typical colors (perceptual or symbolic sources) represent 50% of the processes of designation for the decorative color charts, but only 2% of those of the artistic ones! The same contrast holds between the two practices for the parameter of intensity (25% and 14%) and of localization (25% and 8% respectively). The semantic specificity of the designation of color blocks in the decorative charts is being massively built on a source name, whereas in the artistic charts it is being built around the reference to the material and the nature of the pigments used as coloring products. Here again, it is the practice of color which introduces relevant distinctions; for artistic paints the importance of the materiality of the pigment itself in the manipulation of the color and its fixation contrasts with decorative paints, where the material origin is of no relevance to their users.

5. CONCLUSIONS. This first exploratory work has revealed to us the wealth of the denominations of colors and their variability according to a number of factors, such as the material used, the properties of these materials, or the ultimate use of the product. To reduce the study of the denomination of colors to that of 'basic terms' deprives the analysis of the possible identification of the plurality of principles operating both in the construction of the cognitive structures of what we call 'color' and in the productive capacities of the language. The complexity of the two aspects (cognitive and linguistic) of what constitutes color requires careful investigation of their co-determination. In particular, it becomes difficult to maintain that 'basic' denominations are in a direct relation to 'basic objects' or even 'basic concepts' of a universal nature, in that the same object, here the 'same' color (reduced to its description in a theory of physics) can in fact be represented in language in diverse forms, according to the motivations behind the diverse practices of color. These practices mediate both individual constructions of invariance in memory and collective constructions, all done within the specific resources of the language.

In conclusion, this work confirms the fact the concept of *color* (in the singular) is not a perceptual primitive to be 'extracted' from a world where it would pre-exist, but an abstraction which results from a number of cognitive processes (individual-psychological and collective-historical) which are closely associated with cultural practices, in particular that of the production of artifacts. The concept of color and the denominations of the categories of colors should therefore only make sense if we take into consideration the specific practices which handle colored material and the linguistic forms of the verbal interactions motivated by these practices. This is the kind of cognitive research on color which seems interesting to us, one which re-situates colors in their ethnographic context, in order to specify the limits of the generalizations of Berlin and Kay. An illustration of such research is the study of the designation of the colors of camels among the Neguev Bedouins by Borg (1999). We would also like to insist on the need to contrast the different values given to different perceptual modalities (colors, odors, noises) by different cultures, Classen (1996) and Howes (1986) being examples of such ethnological studies.

It is clear that such a research program which 're-situates' cognition within the totality of human functioning goes counter to the program of naturalization of cognitive studies, in that it takes cognition as a phenomenon which emerges from specific properties of humans as a 'cultural species'. This position does not refute universalist hypotheses since culture, like language, is precisely a universal criterion for the characterization of the human species. Furthermore, the study of the mediation of human practices between the 'world' and 'language' should allow us to go beyond the traditional dualism of our culture, which opposes a solitary subject to a world without thought (Shalins 1976).

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[1] We use the term of 'practice' rather than activity here in order to underline with this concept the collective and social dimension of human activities.

[2] Other practices being explored include the denomination of colors in clothing sale catalogues, wool yarns and cotton threads, cars, hair dyes, make-up (nail polish, lip stick, powders...).

[3] *Brun* was chosen in preference to *marron* on the criteria that the latter refers to a fruit (*marron* 'chesnut' i.e. the name of an object), and *violet* rather than *pourpre* because of the restricted context of use of *pourpre* (only for cloth material).

[4] The repartition of the occurrences of the basic forms is also different according to the 'basic colors', within and across types of practices (see Dubois & Grinevald 2000).

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MEANING CHANGE AND TRUTH-VALUE-BASED SEMANTICS

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1. TRUTH VALUE SEMANTICS. I will take my starting point in truth-value-based semantics in the tradition of Montague (1974). This so-called 'logic' paradigm has proved to be extremely useful in clarifying core issues in semantic processing, like for instance semantic composition, quantification, predication, the distinction of extensional versus intensional contexts, the grammar of focus or the role of utterance context in natural language understanding.

Yet, many linguists feel that the paradigm, in spite of its strengths, is inadequate because of its blind spot at the basis of semantic analysis: Word meaning. Word meanings are modelled by functional objects over the sets of individuals, times, the real and other possible worlds, according to real or counterfactual facts. Basically, the theory captures two aspects of word meaning:

- How would this word behave in combination with other words?
- Where would this word (perhaps in combination with other words) truthfully apply?

It has turned out that an answer to even these two simple questions will result in theories of considerable complexity. This very complexity brings another question into focus, a question that the approach leaves, programmatically, unanswered:

- How do speakers grasp meanings?

Truth value semantics takes it as a basic, unanalyzed fact that speakers do have something in their heads that will allow them to use words like *meat*, *sponge*, *and* or *seek* as if they had the corresponding intensional objects in their brains. Soberly refraining from any introspective meaning paraphrases, this notion of 'meaning' is based on the uncontroversial minimal requirement that two speakers are in command of the same meaning of a word only if they agree on the class of things that correctly can be referred to with that word[1].

Linguists will eventually be doomed to accept some level of cognitive processing as 'given input' for semantic theory. Yet, truth value semantics seems to set that level unfruitfully high and, as a result, has to remain silent with respect to a range of interesting semantic questions:

- How do speakers learn, know, establish and change word meanings?

- How can distinct word meanings be ‘related’ (while other distinct meanings are definitively ‘unrelated’)?
- Why can speakers creatively use words in a shifted meaning?

In the present paper, I propose to build up word meanings from more basic ingredients of meaning. Specifically, I will integrate Gärdenfors’s recent proposal about the geometric nature of conceptual knowledge (Gärdenfors 2000) into truth value semantics, and apply the resulting theory to model certain cases of meaning change.

2. MEANINGS IN THE HEAD. Proper names are certainly the simplest instance of a link between word and meaning. The established bearer of a name is the one and only thing we need in order to know what the name means, as was argued convincingly in Kripke (1972) (a more recent reconstruction of the main arguments can be found in Devitt & Sterelny 1999). The resulting *causal theory of reference* assumes that the meaning of a name is established in an initial act of baptizing in which the name is ‘attached’ to an individual r. In terms of intensional semantics, this leads to the so-called rigid designators: Let name be a proper name in the language under investigation[2].

(1) $[\![\text{name}]\!]$ is a function $f: D_s \rightarrow D_e$ where
$f(w) = r$ for all possible worlds w.

While this idea will work nicely for proper names, it evidently is too simple for the vast majority of words in natural languages that refer to classes of individuals, objects, events, states, processes etc. Putnam (1975) extended the account to natural kind terms (like *gold*, *water*, *tiger*) which he proposes to treat as proper names for natural kinds. The meaning of a natural kind term is again established in an initial act of baptizing with reference to some sample r of the natural kind in question. However, we want to name the entire kind, not only sample r. This is captured by the definition in (2). Let **kind** be a natural kind term, let r be the sample that was pointed at in baptizing. *Substidentity* is the trans-world relation that holds between two lumps of matter exactly if they are of the same substance, or for two organic individuals exactly if they are of the same kind.

(2) $[\![\text{kind}]\!] = f: Ds \rightarrow D(e,t)$ where
$f(w) = \{ b \mid b$ is a lump of matter in w, and b *substidentical* to $r \}$

Note that (2), like (1), does not make reference to human categorization abilities. According to the received view, *substidentity* is a relation that is determined by reality itself, not imposed by human reflection of reality. The position of *realism* has earned its high reputation in philosophy by the fact that it can, better than any other position, explain the nature of scientific progress[3]. Yet, it is a consequence of this assumption that not very many words in our lexicon qualify as natural kind terms, and are captured by (2). There seems to be good reason to ask for a more flexible, less externalist account.

The idea is certainly appealing that the class of objects that is denoted by a word $\boldsymbol{\omega}$ should somehow 'cluster around' those things which were *first* called '$\boldsymbol{\omega}$'. We will leave it open whether these first uses were deliberate baptisms in the literal sense (like names of little babies) or whether the word $\boldsymbol{\omega}$ was established in a more implicit manner (like for instance the adoption of loanwords).

Consider the relation of substitentity in definition (2). Only reality (or, perhaps, God) knows which things are identical in that sense. Arguably, speakers don't know it. I suggest to replace it by a binary similarity relation sim. Loosely speaking then, the word $\boldsymbol{\omega}$ applies correctly to the first sample r which was referred to in baptizing, plus any other object x which resembles (sim) r in the appropriate sense. Some comments are in place.

Firstly, and most importantly, there is more than one respect in which things can be similar. Different choices of respect-in-which-things-are-compared will lead to different classes of things-which-are-similar-to r. A classical place where this observation is discussed (but by no means the only one) is Goodman (1972:421–49). In establishing a new word $\boldsymbol{\omega}$, pointing at a sample object r, we therefore need to specify the respect in which other referents of $\boldsymbol{\omega}$ should resemble r. We will have to choose the intended one of a wide range of similarity relations sim_u, sim_j, sim_k… This assumption, wild as it might look, is in fact supported by findings in experimental studies of word learning like Landau et al. (1998), summarized below.

Secondly, what is the formal nature of these similarity relations? I will adopt a recent proposal that has been made in cognitive science by Gärdenfors (1998, 2000). He argues that similarity is most naturally built on a notion of *distance* over the respective space of objects or events. An object b is similar to another object a if it is 'close enough to a' in terms of that distance. If the question is whether b is like a_1, or like a_2… or like a_n, where these a_i are prototypical members in different classes which we already know, then we will say that b should go with the prototype a_j which is closest to it in terms of that distance. Nothing in the following will crucially depend on the formal nature of similarity. However, in view of the broad literature in the field it might be helpful to locate our approach at some definite point.

Thirdly, where do we determine which is the intended similarity relation in question? Sterelny (1983) observed that even the classical causal theory of reference needs to specify the taxonomic level at which 'identity' is to be determined (even assuming realism). Sterelny argues that this *qua question* is determined by the context in which a baptizing takes place. I will adopt his proposal and assume that the utterance context of a baptize will fix the respect in which the sample is to be generalized. ('Should Fido stand for the class of mammals, for dogs, for male dogs, for pets… ?') Technically speaking, the *qua question* is answered by context in pointing out some *similarity relation* sim_i. Thus, we come to the following modified theory of baptizing:

(3) If word $\boldsymbol{\omega}$ has been introduced in baptizing $\mathbf{c}$ on the basis of sample $\mathbf{r}$ then
$[[\ \mathrm{w}\ ]]$ = a function f from worlds to sets of objects such that
$f(\mathrm{w}) = \{\ \mathrm{x} \mid \mathrm{x}$ is an object in $\boldsymbol{\omega}$ such that $\mathbf{sim(x,r)}$ in $\boldsymbol{\omega}\}$
The similarity relation $\mathbf{sim}$ was salient in context $\mathbf{c}$.

Note that this definition is the starting point for an epistemic interpretation of possible world semantics. It is no longer *reality* that cuts out the classes of objects denoted by a word. Extension and intension depend on speaker's *interests*, as well as their *knowledge* at the time of introduction of $\boldsymbol{\omega}$. Similarity is not a 'realistic' notion in the philosophical sense. It is a conceptual notion, reflecting how speakers see the world.

In breaking down word meanings into core referents and similarity judgements, we have once more reached a level where some notions, namely similarity relations, are taken as basic givens. Humans, as well as animals, do have the ability to compare and match sensual expeciences, if only to ensure sucessful interactions with their environment. It is not the task of the linguist to *explain* these cognitive abilities, yet the linguistic behaviour of speakers can provide additional evidence in the study of these abiltites. For instance the careful study of meaning change, due to different ways to generalize a given set of samples, can be helpful in order to understand in how many ways things can be perceived as being 'similar'. I will elaborate this idea in the following sections.

3. CONTEXTS OF USE. We've seen in the previous section that in a context in which we introduce a word $\boldsymbol{\omega}$, generalizing a given referent $\mathbf{r}$, this generalization will follow the most salient similarity relation $\mathbf{sim}$ suggested by that context. In the present section, I will attempt to give a clearer idea of this process.

Shape is probably the most prominent respect in which an initial sample can be generalized. The meaning of words like *triangle* or *circle* (in their everyday sense where also a somewhat shaky triangle counts as a triangle) are clearly based on the idea of 'being similar in shape to a prototype triangle', 'being similar in shape to a prototype circle'. Shape also seems to be the *default* respect along which we generalize. It is the first respect used by children in categorization (see e.g. Keil (1994)). It is the respect both children and adults will use in absence of any other clues (see Landau et al. 1998). Finally, practically all words which refer to visible things have a reading that can be paraphrased as 'looking like a core instance of…', as exemplified by compounds like *stone lion*, *plastic apple*, *wooden book* or *paper boat*.

Function is often used as *the* alternative respect in which things can resemble each other (exemplified once more by Landau et al. 1998). Certainly, we will have to view *function* as a parametrized respect—if we know that a given sample is to stand for a larger class of objects in terms of function, we will have to observe our fellow humans in order to find out *which* function that sample usually fulfills. Consider the example of tin-openers. They are created for the purpose of opening tins, and everything which resembles core tin-openers in that respect will qualify as a tin-opener. An object which resembles my tin-opener in the functional respect of 'being an instrument with which one could severely hurt enemies' will *not* qualify as a tin-opener (wrong function). An object which looks like a core tin-opener but is unsuitable for opening tins will only be a 'tin-opener' in the shape sense of the word.

We also have to count with mixed cases of function plus shape, or function plus a certain way of fulfilling that function. For example, modern engineering has created tools that fulfill the function of a saw, working with a very thin ray of water that is emitted at high pressure. Is this still a saw? Sometimes the interests of the marketing department may play a role, too. Or, why am I not allowed to call the 'trackball' in my laptop a 'mouse' in spite of it fulfilling exactly the same function? (I did, but was informed that I had something much fancier than a 'mouse'.) We can observe that similarity judgements, in the more sophisticated case, certainly are subject to social negotiations and conventions as to who is licensed to classify a new artifact (as has been nicely shown in Bloom 1996).

Yet, it is possible to provisionally locate certain factors that influence the choice of $\mathbf{sim}$ in an utterance context $\mathbf{c}$ of word $\boldsymbol{\omega}$[4]:

(i) When does $\mathbf{c}$ take place? — Time of $\mathbf{c}$.
(ii) Who were speaker and addressee in $\mathbf{c}$? — Speaker and hearer, and in a broader sense: *language community* they are part of.
(iii) What was the shared epistemic background of that language community at the time? — *Knowledge* in $\mathbf{c}$.
(iv) What was the conversation about? — *Interests* of speaker and hearer in $\mathbf{c}$.
(v) What was the referent $\mathbf{r}$ of $\boldsymbol{\omega}$ in $\mathbf{c}$, if there was any?

We can at least argue that *knowledge* and *interests* contribute to the choice of $\mathbf{sim}$ in a given context. Assume that we have two contexts $\mathbf{c}_1$ and $\mathbf{c}_2$ in which speakers with similar interests talk about some lump of matter $\mathbf{r}$. Assume that these interests are such that the speakers are concerned with $\mathbf{r}$ as a natural substance. However, assume that the speaker community in $\mathbf{c}_1$ has the knowledge of ancient Greek, while the community in $\mathbf{c}_2$ is in hold of modern chemistry and physics. The similarity relation chosen in $\mathbf{c}_1$ will therefore be based on features like color, hardness, mass, etc. while the similarity relation in $\mathbf{c}_2$ might use such sophisticated criteria as mass spectroscopy. This can (but need not necessarily) lead to the fact that the extension of a word $\boldsymbol{\omega}_1$ for '$\mathbf{r}$ and what is similar', introduced in $\mathbf{c}_1$, is different from the extension of a word $\boldsymbol{\omega}_2$ for '$\mathbf{r}$ and what is similar', introduced in $\mathbf{c}_2$. Thus, contexts with equal interest but different knowledge can lead to different concepts. This observation is complemented by similar findings in first language acquisition (see Keil 1989, 1994).

The opposite case consists of a pair of contexts which take place at the same time, in the same speaker community and under the same knowledge, but with different interests. Landau et al. (1998) describe that case and find that subjects indeed will use a new word differently, depending on whether the initial sample was shown to them without further comment or with a prolongued explanation as to what task one would usually fulfill with that object. In the first case, subjects generalized by shape, in the latter by function.

Let me finally comment on the difference between speakers and speaker community. Evidently, we do not want to make word meanings dependent on the knowledge of arbitrary individual speakers. The idea of linguistic 'division of labor' was already introduced in Putnam (1975), and has been accepted without much objection. In that sense, single speakers in some given context c may not even themselves be fully aware of the kind of similarity relation in play. In the case of baptizing, there certainly are correlations between those who are considered to be experts in question and those who are authorized to introduce certain words into the language. Plainly speaking, usually only the biologist is licensed to establish the name of a new species.

In the next section, however, we will elaborate the idea that also contexts of use **c** of a word $\boldsymbol{\omega}$ are relevant for the further meaning of word $\boldsymbol{\omega}$. In such contexts at latest, we have to face the possibility that laymen as well as experts might be speakers and hearers. But they still are part of a larger speaker community and in that sense participate in expert knowledge.

4. WORDS IN TIME. In Section 2, I proposed that word meanings are determined by two ingredients: Some core sample(s) **r** that are known to fall under the word in question and a similarity relation **sim** to generalize these first samples. These two factors can be traced clearly in baptising situations, that is in contexts where speakers want to establish a new word in their language[5]. Yet, many ordinary utterance contexts of a word $\boldsymbol{\omega}$ will provide these two factors as well. Many utterance contexts offer referents **r** for words. All contexts of use take place between speakers and hearers that are part of larger linguistic communities. Many contexts of use are guided by specific interests of the communicating parties, and take place against shared background knowledge. Consequently, many contexts of use **c** of a word $\boldsymbol{\omega}$ provide us with everything that would be necessary to learn or establish some meaning for word $\boldsymbol{\omega}$. Nothing, however, ensures that the context of use provides us with exactly those referents **r** and similarities **sim** that will create the 'traditional' meaning of word $\boldsymbol{\omega}$. The context **c** might support a new meaning for $\boldsymbol{\omega}$ (although speaker and hearer will usually know and use $\boldsymbol{\omega}$ in its traditional meaning, of course).

While this is undangerous in the isolated case, it is the point where a great potential for language adaption, also called 'meaning change', is hardwired in our language faculty:

- If the most frequent core referents change over time, the resulting category may gradually follow its shifting core.
- If a word is used under a new perspecitve, or with new interests in the objects refered to, it may adopt a new meaning that reflects these changed interests.
- If background knowledge changes, speakers may also see the need to adapt their similarity judgements to advanced knowledge.

Let us look at some word histories that exemplify these three types of meaning change and extension[6].

The German word *Karussell*, which was taken over from French *carrousel* in the second half of the 17th century, originally denoted a form of tournament game where the task was to hit a ring with the lance while riding past it on a horse. In the 18th century, a variant of the original game became popular where the players had to hit the rings from a pivot mounting, sitting on wooden horses instead of real ones.

While this variant was still, in a sense, the old game, and while the participants' interest *still* consisted in 'having fun', the kind of 'fun' taken out of the game changed: The original 'Karussells' were sportive competitions , the new version was already fun because one could travel in rounds on hobby horses. Following these new core exemplars, the category of 'Karussell' moved towards its present extension (like **E** *caroussel*). It was reported to me that in Holland, at least until 30 years ago, caroussels had a bell attached at the roof. Riders who hit that bell could win a free ride. This version of caroussel still maintained an element of skill and competition.

In Germany today, the rings or bells to be hit have completely vanished from the 'Karussell', and the horses now come in the company of little cars, swans, bikes, closed carriages and all other sorts of vehicles which would have been unsuitable for a 'Karussell' in the sense of 1650.

The word *Kreide* 'chalk' has two meanings in contemporary German. In one reading $Kreide_1$, it means 'calcium carbonate' and is used as a name for a chemical substance. In a second reading $Kreide_2$ it denotes a writing tool, typically the small handy piece of $Kreide_1$ which can be used to write on blackboards. The two readings differ. Modern industry has created $Kreide_2$ not only coming in different colours, but also made from other materials which resemble $Kreide_1$ to a greater or lesser degree. The pieces of $Kreide_2$ which deviate most from $Kreide_1$ are *Malkreide* or *Wachskreide* (crayons) on the basis of wax (or, again, its modern substitutes) for kids to draw colourful paintings. It is easy to see how both readings are generalizations over the same core referents: Small pieces of a soft white stone that are good for drawing and writing.

Actually, $Kreide_1$ nowadays becomes fashionable in a second tool sense, namely as a white powder which, mixed with water, can be used to paint walls. Time will show if even a further reading $Kreide_3$ will develop on this basis which has an extension distinct from both, $Kreide_1$ and $Kreide_2$.

German *Pilz*, in its colloquiual meaning, covers both eatable mushrooms and poisonous toadstools, as long as they exhibit the typical stem-and-cap shape, with a vague boundary towards species like morels and puff-balls. The word however acquired a second, botanical meaning where category boundaries are determined by similarity of reproduction mechanisms rather than similarity in shape. In this scientific sense, 'Pilz' extends to, for instance, kinds of mould or the fungus used in penicillin production. In cases like this, specific interests in taxonomy conspire with more sophisticated knowledge of the scientific language community to determine the technical sense of a word, which only afterwards spreads into the common speaker's lexicon.

Note that the account is by no means restricted to nouns. A very nice example of meaning change in the case of verbs can be found in Verdaguer and Poch (1998) who observe that both in English and Catalan, verbs that denote the state of 'being awake' (OE *wæccan*) follow a meaning development over several steps, eventually turning into verbs that express visual attention or observation (ModE *watch*). Let us have a look at one step in detail, the one from *watch* = REMAIN AWAKE to *watch* = BE WATCHFUL. Verdauger and Poch claim that the latter *watch* consists in the former, plus an additional feature **[+ mentally aware]**. If that were so, we'd expect that BE WATCHFUL should be a special form of REMAIN AWAKE. This is, however, not true. Specifically, REMAIN AWAKE presupposes that the agent is tired and inclined to sleep (or that there are other expectations or plans for him to fall asleep). BE WATCHFUL, on the other hand, does not carry any such presupposition.

It seems more appropriate to capture this meaning development as a case where core instances of 'remaining awake' are generalized in a new direction, different from the old one that led to the category of eventualities where someone remains awake: Why does one typically stay awake, instead of giving way and falling asleep? Apart from religious purposes, one typical situation is the one where one gets tired in hostile surroundings. REMAINING AWAKE under such circumstances has the immediate purpose of 'keeping watch, being prepared to meet danger'. If we take into account this typical interest in staying awake, and generalize the activity of the watching agent in that direction, we immediately come to the concept of BEING WATCHFUL and KEEP WATCH. Moreover we will expect quite naturally that there will be instances of KEEP WATCH which are not instances of REMAIN AWAKE, and vice versa.

The other steps in the word history of *watch* as described by Verdauguer and Poch fall equally nicely into place, and the fact that similar meaning developments took place in English and Catalan can be explained by the simple observation that the same conflict between being tired and being afraid of imminent dangers can well arise in any culture, without having to resort to such grand labels as 'being grounded in human cognition'.

Let me finally briefly indicate how these insights can be reconstructed in formal terms. Interestingly, the previously purely semantic modelling will have to be augmented by those aspects of actual history that influence the meaning of word $\boldsymbol{\omega}$[7]: A set of contexts of use $\mathbf{C}$, a function time that yields, for each context $\mathbf{c}$ in $\mathbf{C}$, the time at which $\mathbf{c}$ occurs, a function $\mathbf{s}$ that maps contexts to similarity relations $\mathbf{sim}_i$, and a partial function **ref** that maps contexts $\mathbf{c}$ to the intended referent **r** in $\mathbf{c}$ (if there is any).

We can now define $\mathbf{C(t) := \{ c \mid time(c) = t \}}$, the set of all cases where $\boldsymbol{\omega}$ was used at time **t**. Next, we can sort this full set into subclasses of contexts which all support the same similarity respect: $\mathbf{[\, c\,]sim := \{ c' \mid c' \in C(t)}$ and $\boldsymbol{\sigma}\mathbf{(c)}=\boldsymbol{\sigma}\mathbf{(c') \}}$. The last step consists in collecting the referents in these contexts: $\mathbf{ref([\, c\,]_{sim}) := \{ r \mid \exists c' \in [\, c\,]sim}$ such **that** $\mathbf{ref(c')=r \}}$. Eventually, one will want to reduce these actual referents to the class of those that were the most common referents, or that constitute a homogeneous class in themselves (see Geeraerts (1997) on the effect of prototypes in diachrony), but let me refrain here from this extra step.

Given these factors, the potential meanings of word ω at time $t+1$ can be characterized as follows:

> f is a potential meaning of ω at time $t+1$ if there is a $c \in C(t)$ such that
> $f(w) = \{ x \mid \exists r \in ref([\ c\ ]_{sim})$ such that $sim(x,r)$ in ω holds true $\}$

Two comments are in place. Firstly, we have attempted to characterize the potential meanings of a word ω at time $t+1$, given that we know how ω was used at time t. This, of course, does not and can not tell us which of those potentials actually are installed in the language. Large sets $[\ c\ ]_{sim}$ will presumably be more likely to establish the corresponding meaning while small, isolated and idiosyncratic sets $[\ c\ ]_{sim}$ are less likely to alter language (note in that connection how mass media can multiply a single utterance into millions of contexts of use with different hearers each). Yet, the status of the speaker in c will also play a role, as well as the question whether the respective hearer in c has safe knowledge about the 'traditional' meaning of ω or actually uses c as a clue to guess what word ω might mean.

Secondly, the account is evidently limited to those new meanings that arise through the processes under discussion in this paper. I do not intend to capture meaning extensions or shifts through reanalysis, folk etymology, metonymy or ellipsis. It is an open question as to how far the present apporach can be generalized to metaphoric extensions (see Gaerdenförs 1996 and Gentner 1983).

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[1] …and if they both combine the meaning of that word with other items in the same ways. We will in the following ignore these compositional aspects of meaning.

[2] In accordance with the literature, I will adopt the following notational conventions: De stands for the domain of individuals ($e \approx$ entity), Ds for the domain of possible worlds. Individual concepts are represented by functions that map worlds onto individuals (abbreviated: $D_s \rightarrow D_e$).

[3] In Devitt and Sterelny (1999); Eckardt (1999) critiques the concept of 'natural kind term'.

[4] Note that this set is redundant in that some of these factors depend on others. I chose to name all factors explicitely for the sake of clarity.

[5] Unless the new word has a clear definition. Yet, I think that not many word meanings are introduced by means of a definition. A more common case is the one where the core samples are not given by ostension, but through a verbal description (e.g. *unicorn*). I see these examples as a more complex case of my account rather than as words that follow definitions.

[6] The reader will have noticed that I do not distinguish between cases of literal meaning shift and cases where a word adopts a related additional meaning. Such cases of polysemy are often filed as 'meaning change' if the original first reading gets out of use.

[7] The exposition is simplified in various respects. For one thing, I refrain from offering an explicit implementation of knowledge states, speaker communities and interests that are determinant factors in the mapping of contexts to similarity relations. Second, I have systematically omitted all formal discussions of properties of similarity relations. A third simplification consists in restricting the formalism to the history of only *one single word* in time. A fuller treatment is offered in Eckardt (1999).

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VERB MEANING AS EVENT STRUCTURE

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Semantic theories based on predicate-argument structures have always acknowledged that lexical information associated with verbs is the basic source for the rudimentary semantic structure of sentences. The central role of verbs in sentence structure has become a major insight of modern syntactic theories since the lexical turn in linguistics, too. As a result of this development there has been an increasing interest in theories on the lexical representation of verbs.

This paper will briefly review prevailing theories on verb semantics (section 1), showing that they can capture only a part of the wide range of syntactic and semantic phenomena dependent on verb meaning. For several of these phenomena (section 2) it will turn out that a theory based on highly structured events is more suitable for representing verb meaning. This theory is based on the idea that verbs refer to events that consist of several subevents which are temporally related, classified according to their duration, and whose event participants are connected to some but not necessarily all subevents by semantic relations (section 3)[1].

1. verb meaning theories. The nineties have seen three major approaches to lexical verb semantics: a revival of thematic-role based theories, lexical decompositional approaches and event structure theories[2].

The most successful approach to thematic roles recently has been Dowty's (1991) proto-role theory, which conceives of thematic roles as prototypes. Each role comes with a bundle of lexical entailments associated with it. Roughly, the verb's argument for which the most agent-specific entailments hold qualifies as the proto-agent, while the one with the most patient-specific entailments will become the proto-patient.

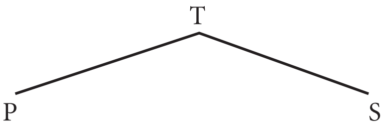
Lexical decompositional theories like Levin and Rappaport Hovav (e.g., 1994) or Wunderlich (1992, 1996) assume that the meaning of each verb is captured in a hierarchical representation based on a predicate logic that contains primitive predicates like cause and become.

Finally, event structure approaches to verb meaning are based on Pustejovsky (1991), who assumes that each verb refers to an event that can consist of subevents of different types, where 'states' (S) and 'processes' (P) are simple types which can combine to yield the complex type 'transition': $[P\ S]_T$. In addition to this event structure (ES), Pustejovsky assumes the level lcs', where each subevent is related to a decomposition. Out of this, a third level of Lexical Conceptual Structure (lcs) can be derived, which contains a single lexical decomposition.

Combinations of any two of these basic approaches also occur. Grimshaw (1990) combines a hierarchical thematic-role based representation with an aspectual representation drawn from Pustejovsky's event structure. In Wunderlichs (1996) Lexical Decompositional Grammar, lexical decompositions are provided with an event argument that is sorted with respect to its event structure properties. Van Valin's (1990) Role and Reference Grammar allows the derivation of thematic roles from certain positions in decompositional structures.

A verb like *to dry off* (as in *Ron dried off the beer mug*) is represented in a thematic role approach as in (1)a and in a decompositional approach as in (1)b (possibly with an additional sorted event argument), while a Pustejovsky-style event structure representation is as in (1)c:

(1) a. *to dry off*: $<\mathsf{x}^{\text{(PROTO-)AGENT}}, \mathsf{y}^{\text{(PROTO-)PATIENT}}>$
b. *to dry off*: (x CAUSE (BECOME(DRY y))) ($\mathsf{e}^{\text{TRANSITION}}$)
c. *to dry off*: ES:



LCS': act(x,y) & ¬ dry(y) dry(y)
LCS: cause (act(x,y), become(dry(y))))

Surprisingly, the question of what kind of phenomena besides linking phenomena have to be captured by theories on verb semantics has only rarely been discussed, the mapping from semantic to syntactic structures having been the dominant subject ever since early theories on thematic roles. But the range of phenomena whose explanation depends on appropriate lexical representations of verbs is much broader. There are at least five types of phenomena to be distinguished:

a. Semantics-syntax mapping: Semantic properties of verbs determine to a large degree the syntactic realization of arguments and the ability to take part in valence alternations, resultative constructions, etc.
b. Grammatical-categorial restrictions: Verbs are semantically classified with respect to their ability to occur in certain grammatical categories like progressive, imperative, or particular voices.
c. Interlexematic relations: Verbs stand in semantic relations to each other, such as antonymy, hyponymy or synonymy.
d. Inference behavior: Lexical properties influence the inference behaviour of lexical items in complex expressions. In particular, there are lexically-based inference peculiarities that show up in regular alternations of sentence patterns (diathesis, change in tense or grammatical aspect). These are due to the membership of the participating verb in a particular semantic class.

- E. SELECTIONAL RESTRICTIONS: The combination of a verb with other lexemes is subject to certain semantic restrictions. This concerns the co-occurrence of particular adverbials or derivational morphemes with certain classes of verbs and verb-dependent restrictions on the NPs filling argument positions.

Most theories on verb semantics have not been developed to cover all of these phenomena. In particular, thematic role approaches and many decompositional theories are exclusively devoted to linking phenomena, while event structure theories try to capture some of the data concerning selectional restrictions and inference behavior, too. Of those theories solely occupied with linking phenomena, some are not explicit about how to handle phenomena of the types B through E, while others assume different levels of lexical semantic representations, suggesting that linking phenomena are handled on a semantic level (in a narrower sense) while some of the non-linking phenomena might be accounted for on a different, conceptual level. However, I am not aware of a theory on verb semantics that aims at covering data of all five types.

In the following section I will present a sample of data that covers these five kinds of phenomena, most of which have rarely if at all been discussed in lexical semantics. I will show that the representational distinctions made by the above-mentioned theories are not sufficient to account for these data.

2. PHENOMENA UNEXPLAINED. A widespread assumption is that events are a basic ontological sort in a semantic theory and are therefore represented by event arguments. Furthermore, the majority of event semanticists assume that event arguments are lexically projected from verbs or verbs of certain classes. Thus, event structure theories and many decompositional and thematic role approaches include event arguments in their lexical semantic representations.[3] The main motivation for event arguments comes from the assumption that many adverbials are predicates over events (Davidson 1967). Thus, those theories which assume that the subevents an event consists of also have to be included in the lexical representation of verbs raise the expectation that subevents are visible for adverbial modification processes. In fact, it has been shown by Pustejovsky (1991) and Wunderlich (1992) that adverbs like *rudely* or *almost* show ambiguities that can be explained by assuming that they are either related to the whole event or to the result state. A closer look at some other adverbial modification phenomena shows that an event structure even more fine-grained than the one suggested by Pustejovsky is desirable for the explanation of the interpretation of adverbials. In (2), each of the adverbial PPs headed by *mit* is clearly related to a different part of the event, as the respective implications show.

(2) a. *Otto fuhr den Wagen mit großem Vergnügen*
‘Otto was driving the car with great pleasure’
→ Otto was doing something with great pleasure
↛ the car was moving with great pleasure
b. *Otto fuhr den Wagen mit Höchstgeschwindigkeit*
‘Otto was driving the car at highest speed’
↛ Otto was doing something at highest speed
→ the car was moving at highest speed

If we assume that two subevents are involved here, a causing subevent $\mathbf{e}^1$ (Otto operating the car) and a caused subevent $\mathbf{e}^2$ (the car moving), the difference between (2)a and (2)b can be explained[4]. The first adverbial, *mit großem Vergnügen*, modifies $\mathbf{e}^1$, the second one, *mit Höchstgeschwindigkeit*, $\mathbf{e}^2$ (cf. Engelberg 2000 for more examples)[5].

Further support for the assumption of structured events comes from interlexematic relations like hyponymy, antonymy or synonymy which are rarely discussed in verb semantics. Quite possibly, this is due to the fact that they cannot be easily accounted for in decompositional approaches[6], which have dominated verb semantics for quite a while. Expressions like *run somewhere* vs. *jog somewhere* (3) and *alter something* vs. *shorten something* (4) show a hyponymy relation. Every *jogging to somewhere* is a *running to somewhere* (but not the other way around) and every *shortening something* is an *altering something* (but not the other way around).

(4) a. *Rebecca jogged to the lake*
b. *Rebecca ran to the lake*
(5) a. *the tailor altered her pants*
b. *the tailor shortened her pants*

But there is a difference between these two pairs. In (5) the hyponymy relation is related to the result state (the result state of *shortening* is a specific case of the result state of *altering*), whereas in (4) it is related to the agentive subevent (the activity of jogging is a special form of running), and not to the result state of being somewhere. By referring to structured events, we can refine and relativize the idea of hyponymy as follows:

- The verb *to run* (in its directional variant) is a hyponym of *to jog* with respect to the agentive subevent $\mathbf{e}^1$ because all properties of $\mathbf{e}^1$ which can be inferred from *to run* can also be inferred from *to jog* with respect to its agentive subevent $\mathbf{e'}^1$. It follows from *to run* that the agent moves his legs in $\mathbf{e}^1$. The same follows from *to jog* with respect to $\mathbf{e'}^1$, but where *to jog* also implies that $\mathbf{e'}^1$ is a kind of a sports activity and relatively slow.
- The verb *to alter* is a hyponym of to shorten with respect to the result state $\mathbf{s}$ because all the properties of $\mathbf{s}$ which can be inferred from *to alter* can also be

inferred from *to shorten* with respect to its result state **s'**. It follows from *to alter* that the altered object is different than before. The same follows from *to shorten* with respect to **s'**, but in addition *to shorten* also implies that the different property of the object consists in being shorter than before[7].

2.1. FIRST CONCLUSION. Lexical representations should make reference to structured events. These event structures have to be more fine-grained than the one suggested by Pustejovsky (1991), allowing up to two process-like subevents plus a result state.

A second group of phenomena involve non-prefixed transitive verbs in German which show a valence alternation between an accusative NP and a PP headed by an.

(7) a. *Rebecca baute eine Hundehütte / an einer Hundehütte*
lit. Rebecca built a doghouse / at a doghouse
approx. 'Rebecca built / was building a doghouse'
b. *Rebecca streichelte ihre Katze / *an ihrer Katze*
'Rebecca petted / was petting her cat'
c. *Rebecca brach ihren Arm / *an ihrem Arm*
'Rebecca broke / was breaking her arm'
d. *Rebecca kniff ihren Freund / *an ihrem Freund*
'Rebecca pinched / was pinching her boyfriend'

As the examples in (7) show, there is a subset of transitive verbs that allow the *an*-construction, like those in (8)a, while other transitive verbs don't (8)b[8].

(8) a. *an*-construction possible: *waschen* 'to wash', *schreiben* 'to write', *bügeln* 'to iron', *reparieren* 'to fix', *stricken* 'to knit', *manipulieren* 'to manipulate', *kochen* 'to cook', *rechnen* 'to calculate', *nähen* 'to sew'
b. *an*-construction not possible: *kennen* 'to know', *quälen* 'to tease/torture', *photographieren* 'to photograph', *sehen* 'to see', *sprengen* 'to blow up', *stehlen* 'to steal', *lösen* 'to solve'

The crucial restriction for the *an*-construction involves two parameters: it is restricted to verbs that express: a., an event of a certain duration which, b., leads to a result state as in (7)a. Neither non-resultative durative verbs (7)b nor punctual verbs with (7)c or without result state (7)d allow this alternation[9].

The distinction between the reference to durative vs. punctual events is not made in any of the theories discussed in section 2, which is particularly problematic for those theories which claim to be able to represent all the information relevant for linking phenomena. Beyond the valence alternation in (7), there are many other phenomena in the domains of selectional restrictions, grammatical-categorial restrictions and semantic-syntax mapping which require a lexically based distinction between punctuality and durativity (Engelberg 1999a, 1999b).

2.2 SECOND CONCLUSION. Verbs have to be lexically marked as to whether they refer to punctual or to durative events. It has often been observed that with causative-inchoative verb pairs, a sentence containing the causative verb entails the sentence containing the inchoative verb, as in (9). But what has not been noticed is that this entailment relation does not always hold if verbs are put in the progressive form (10)[10].

(9) a. *Rebecca dried her hair* → *her hair dried*
b. *Rebecca felled the tree* → *the tree fell*
(10) a. *Rebecca was drying her hair* → *her hair was drying*
b. *Rebecca was felling the tree* ↛ *the tree was falling*

The different inference behaviour in (10) can be put down to semantic pecularities of the verb to dry on the one hand and to fell on the other. With *to dry* the temporal relation between the causing event (Rebecca acting upon her hair) and the caused event (her hair drying) can be conceived of as temporally parallel or overlapping. This temporal relation does not hold with *to fell*; the causing event (Rebecca acting upon the tree) necessarily precedes the caused event (the tree falling).

2.3. THIRD CONCLUSION. Another lexical parameter, not accounted for in the theories discussed above, involves the different kinds of temporal relations between subevents. Occasionally, it has been noticed (e.g., Morgan 1969, Pustejovsky 1991) that phrases of the type *for one hour* show a certain ambiguity. In (11)a the *for*-phrase is related to the activity of jogging, in (11)b to the result state of being out of the house:

(11) a. *he jogged for twenty minutes*
er joggte ***zwanzig Minuten lang***
b. *he left the house for twenty minutes*
er verließ das Haus ***für zwanzig Minuten***

As the translations in (11) show, these two readings are expressed by two different phrases in German. The restrictions for the German *für*-PP are particularly interesting. A corpus-based investigation revealed that the *für*-PP referring to a result state is only acceptable if the result state of the event is controlled by the agent as in (12)a and (12)b. If demonstrators block a street (12)a, the result state of the street being blocked will hold as long as the demonstrators maintain this state, while the state that results from loosing a key (12)c is not controlled by the agent. (Within the glosses, *for* is intended to refer to the length of the result state and not the preceding activity.)

(12) a. *sie blockierten die Straße für eine Stunde*
'they blocked the street for one hour'

(12) b. *sie besetzten die Fabrik für drei Tage*
‘they occupied the factory for three days’
c. ?? *sie verlor den Schlüssel für einige Minuten*
‘she lost the key for five minutes’
d. ?? *sie aß den Apfel für eine Stunde*
‘she ate the apple for one hour’

Thus, the contrast in grammaticality between (12)a and (12)b on the one hand and (12)c and (12)d on the other hand, which is due to the involvement or non-involvement of the agent in the result state, supports a suggestion that was made by Grimshaw (1990) in a different context, namely that the event participants are linked to particular subevents for different verbs[11].

2.4 FOURTH CONCLUSION. Lexical entries of verbs have to reflect the fact that the participants of the event the verb refers to are not necessarily involved in all subevents, but only in some of them, and that they are involved in different subevents in a different manner.

Another well-known puzzle of lexical semantics and aspect has been the question why some verbs cannot occur in the progressive aspect:

(13) a. *Rebecca was pinching Jamaal / was hopping* (→ repeatedly)
b. *Rebecca was winning the race / was arriving*
c. ??*Rebecca was noticing that* / ??*that was astonishing Rebecca*

The occurrence of punctual verbs in the progressive, as well as their interpretation, is subject to restrictions, whereas all durative verbs allow the progressive[12]. First, non-resultative punctual verbs are interpreted iteratively when they occur in the progressive (13)a. Secondly, some punctual verbs can occur in the progressive because they presuppose a preceding event, as in (13)b, where it is pre-supposed that Rebecca participated in the race or was nearing the completion of her journey[13]. In this case, the progressive sentence is related to the time of this preceding event. Finally, only punctual verbs that do not belong to these two types—especially those that lead to cognitive states as in (13)c—do not occur in the progressive aspect.

2.5 FIFTH CONLUSION. Meaning representations of verbs not only have to include information about those subevents whose occurrence is implied but also about those whose occurrence is presupposed. This overview of unexplained phenomena, first, has shown that there are many phenomena that are not accounted for in prevailing theories on verb semantics and, second, that these phenomena fall into each of the five classes of phenomena relevant to lexical semantics: linking phenomena as in (7), grammatical categorial restrictions as in (13), selectional restrictions as in (12), interlexematic relations as in (4), and inference restrictions as in (2) and (10). Thus, even if we take into consideration that current theories of verb semantics are devoted only to the explanation of data of some of these classes, there are always some data falling into the domain of these theories which they cannot explain. In the next section I will develop the outline of a theory of verb semantics that can account for the phenomena presented in this section.

3. AN EXTENDED ‘LEXICAL EVENT STRUCTURE’ APPROACH. The phenomena discussed in the last section suggest that lexical representations of verbs should be based on the notion of events and their properties, i.e., their mereological structure, the length of subevents and the temporal relations between them as well as the relations between subevents and their participants.

These ideas are captured by the following theory that I will refer to as ‘Lexical Event Structure Theory’. Its basic idea is that the meaning of a verb is to be represented as a lexical event structure (LES) which has the following characteristics:

A. COMPLEXITY OF EVENTS: Verbs refer to events that are internally structured in the sense that they can consist of different subevents ($\mathbf{e}^1$, $\mathbf{e}^2$,…) and a possible result state ($\mathbf{s}$).
B. SORTS OF SUBEVENTS: The subevents are durative ($\mathbf{e}^{\mathrm{DUR}}$) or punctual ($\mathbf{e}^{\mathrm{PCT}}$).
C. RELATIONS BETWEEN SUBEVENTS: A subevent can precede another subevent (<) or subevents can be temporally parallel or to a large degree overlapping (<>).
D. PARTICIPATION IN SUBEVENTS: The event participants which correspond to the verb arguments are not necessarily involved in all subevents, but rather only in some of them; semantic functions like ‘control’, ‘move’, ‘volition’, etc., relate participants and subevents[14].
E. IMPLICATION VS. PRESUPPOSITION: The occurrence of a subevent is either entailed ($\rightarrow_{\mathrm{I}}$) or presupposed ($\rightarrow_{\mathrm{P}}$) by the open proposition that constitutes the verb’s meaning, i.e., by an expression like ‘verb($\mathbf{x}$,$\mathbf{y}$,$\mathbf{e}$)’.

Some examples will illustrate how this has to be applied to particular verbs. The two-place verb *abtrocknen* ‘to dry off’ as it appears in (14) always refers to a complex event where the first subevent $\mathbf{e}^1$ is not punctual but of a certain duration (DUR) and involves two participants, an agent and a patient, e.g. Ron’s acting upon the beer mug. Simultaneously (‘<>’), a second event $\mathbf{e}^2$ occurs only involving the patient, namely the the beer mug becoming dry. This results in a following (‘<’) state s of the beer mug being dry.

(14) a. *Ron hat sein Bierglas abgetrocknet*
‘Ron dried off his beer mug’
b. *Silvia hat sich die Füße abgetrocknet*
‘Silvia dried off her feet’

(14) c. *Klaus hat seinen kleinen Bruder abgetrocknet*
‘Klaus dried off his little brother’

This is captured in the LES of abtrocknen ‘to dry off’ as follows:

(15) a. *abtrocknen*: x^{nom}, y^{acc}
b. LES: $(\rightarrow_I e^{1[+DUR]}: x^{AGENT}, y^{PATIENT}) <> (\rightarrow_I e^{2[+DUR]}: y^{PATIENT})$
$< (\rightarrow_I s: y^{PATIENT})$

Some other representations of verbs mentioned in section 2 illustrate this idea. The causative but non-resultative *fahren* ‘to drive, to go by car/train’ requires a structure similar to causal resultatives like *to dry off*, *to blacken*, etc. but lacks a result state in its non-directional variant:

(16) a. *fahren*: x^{nom}, y^{acc}
b. LES: $(\rightarrow_I e^{1[+DUR]}: x^{AGENT}, y^{PATIENT}) <> (\rightarrow_I e^{2[+DUR]}: y^{PATIENT})$

In contrast to *abtrocknen*, the agentive-causative *blockieren* ‘to block’ is characterized by a result state which is controlled by the agent:

(17) a. *blockieren*: x^{nom}, y^{acc}
b. LES: $(\rightarrow_I e^{1[+DUR]}: x^{AGENT}, y^{PATIENT}) <> (\rightarrow_I e^{2[+DUR]}: y^{PATIENT})$
$< (\rightarrow_I s: x^{AGENT}, y^{PATIENT})$

While the causative *fällen* ‘to fell’ is similar in most respects to verbs like *abtrocknen* ‘to dry off’, it implies a different temporal relation between the causing and the caused subevent, since in contrast to *abtrocknen* the causing subevent completely precedes the caused one:

(18) a. *fällen*: x^{nom}, y^{acc}
b. LES: $(\rightarrow_I e^{1[+DUR]}: x^{AGENT}, y^{PATIENT}) < (\rightarrow_I e^{2[+PCT]}: y^{PATIENT})$
$< (\rightarrow_I s: y^{PATIENT})$

Finally, the verb *gewinnen* ‘to win’ (in the sense of ‘win a competition’) is distinct from the verbs above because the occurrence of the first subevent is not implied but presupposed[15]:

(19) a. *gewinnen*: x^{nom}, y^{acc}
b. LES: $(\rightarrow_P e^{1[+DUR]}: x^{AGENT}, y^{PATIENT}) < (\rightarrow_I e^{2[+PCT]}: x^{AGENT}, y^{PATIENT})$

The event structures above are shorthand notations for representations in a type-driven predicate logic with a lambda-operator as in Engelberg (2000), where more precise definitions of the semantic predicates and relations involved in the representations are given. The complete representations given there also contain more detailed information about the specific result states, causal relations and the semantic relations between participants and subevents.

To conclude, a satisfactory lexical semantic account of a broad range of data like linking phenomena, grammatical-categorial restrictions, lexical inference behavior, interlexematic relations, and selectional restrictions can be provided by event structure representations. The Lexical Event Structure theory proposed in this paper is based on the assumption that verbs refer to events consisting of subevents which are characterized for duration and stand in temporal relations to each other and to which the event's participants have specific semantic relations. It has been demonstrated how the restrictions for a number of phenomena from the domain of German and English verbs can be captured within this theory.

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[1] The research presented in this paper has been carried out in the project SFB 282 'Theory of the Lexicon', funded by the Deutsche Forschungsgemeinschaft. I am grateful to Jennifer Ruth Austin for discussion and proof-reading.

[2] Besides these theories, much work has been done on aspectual properties of verbs and their projections which, despite its amount, has not led to very sophisticated lexical representations of verbs.

[3] Thematic-role based approaches with event arguments usually employ neo-davidsonian representations, in particular in theories on aspectual compositions, e.g., for *to eat*: EAT(e) & AGENT(x,e) & PATIENT(y,e).

[4] Besides these two subevents an additional result state has to be assumed if a directional PP occurs as in *er fuhr den Wagen gegen einen Baum* 'he drove the car into a tree'.

[5] The verb *fahren* 'to drive, to go by car/train' in fact shows a causative alternation in German: i) *der Wagen fuhr* 'the car moved'; ii) *er fuhr den Wagen* 'he drove the car'.

[6] This has already been shown by Fodor (1977).

[7] A slightly different case constitutes the relation between *to dye* and *to blacken* which, at first glance, seem to stand in a hyponymy relation with respect to the result state as well:

(i) *Jamaal blackened his shoes*
(ii) *Jamaal dyed his shoes*

It follows from *to dye* that the dyed object has a different color than before. The same follows from *to blacken* with respect to its result state, but with the difference that *to blacken* also implies that the new color of the object is black. But there is a problem, as conference participants pointed out: The verb *to blacken* refers to a more superficial application of paint etc., whereas *to dye* involves a coloring of the substance beneath its surface, too. Thus, a sentence like (iii) does not imply (iv):

(iii) *Jamaal blackened his face*
(iv) ?*Jamaal dyed his face*

Yet, the relativized hyponymy relation still holds with respect to a certain description of the result state. If the result state of *to dye* is understood in the sense that every part of the object to which the paint / dye has been applied has a different color afterwards and the result state of *to blacken* is characterized by the fact that every part of the object to which the paint / dye has been applied is black afterwards, we still get a hyponymy relation with respect to the result state. A relativized hyponymy relation which only holds under a certain description of the result state constitutes a case of 'weak hyponymy'. This notion still captures the obviously different degrees of specificity present in pairs like *to dye* and *to blacken*.

[8] For independent reasons the *an*-construction never occurs with derived verbs, cf. Engelberg (1994).

[9] In Engelberg (1999a) it is shown how the notion of 'punctuality' in the sense of 'of very short duration' can be linked to cognitive time concepts.

[10] This phenomenon is not to be confused with the imperfective paradox, according to which the inference from a sentence in the progressive to a sentence in simple tense is not valid for accomplishment-type verbs.

[11] More data that give rise to this assumption are discussed in Engelberg (2000), involving causativization phenomena as well as the realization of the agent in certain passive constructions.

[12] There are restrictions on stative verbs in progressive form, too, but these will not be discussed here.

[13] That this is a presupposition rather than an implication is evident because it even follows from the negated sentence Rebecca did not win the race that Rebecca participated in the race.

[14] For simplicity, I will not list the particular semantic relations in the following representations (cf. Engelberg 2000) but just speak of agents and patients in a very unspecific way.

[15] The second argument can be classified as a patient in a framework like Dowty's (1991) prototype theory, but as I mentioned before, the thematic relations in these abbreviated representations are just a shorthand notation for more specific relations anyway.

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◆

TENSIONS WITHIN AND AROUND A LEXICAL CATEGORY: *EARTH* AND RELATED ITEMS

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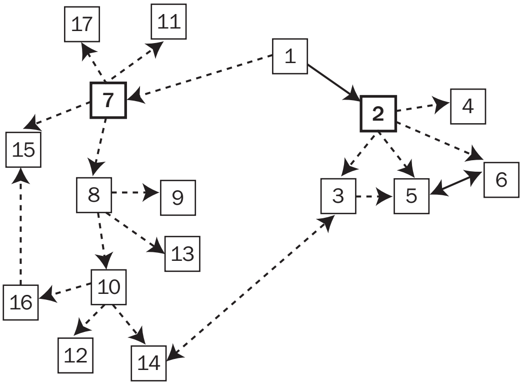
Inquiries into the nature[1] of lexical meaning assume various forms. In the long-established linguistic tradition of semantic fields (cf. e.g. Trier 1931, Lyons 1963, Lehrer 1974, 1992), the meaning of a word is seen as dependent on that of other words in the lexicon. The contrary tradition, represented for instance by Wierzbicka, sees lexical meanings in positive rather than relational terms as 'unique and culture-specific configurations of universal semantic primitives' (Wierzbicka 1996:183) and as such semantically independent of other words.

Through an analysis of textual manifestations of lexical items, the present study aims to show that the two views are better seen as complementary rather than mutually exclusive. In texts, words enter into relationships with other words, the context 'shaping' their semantic values. On the other hand, such a contextually shaped word evokes a series of associations with other of its senses. Thus, a word's meaning may be seen, simultaneously, in relation to its verbal context or environment[2], in relation to meanings of other words within the relevant semantic field, and as a value inherent in the category of its own senses. Observations of intricate patterns of lexical use have led Sandra and Rice to ask 'whether the richness in usage types belongs to the domain of lexical meaning or to the domain of sentence meaning' (1995:99). Again, rather than 'whether-or', the question might be formulated as *to what extent* the two factors are relevant in a particular case.

Lexical meaning is viewed here in global terms, that is, as a complex of all of the word's senses. Langacker proposes to represent a lexical category as a network of interrelated senses, the conventional semantic value of the category being 'equated with the entire network, not with any single node' (1991:3). Nodes in the network, representing the word's senses, are linked via various categorizing relationships[3]. Below, we will treat the relationships as intracategorial tensions *resulting* from the word's textual usages and an interplay of the features of the co-text. Furthermore, tensions are observed to arise between senses/nodes of different networks and consequently between entire networks or lexical categories[4]. Thus, both intracategorial and intercategorial tensions are said to figure in the specification of a word's meaning, the former as dimensions of the word's semantic potential (Fuchs 1994:101), the latter as its status relative to other items. In short, 'it is not sufficient… to treat word meaning exclusively in terms of relations between lexical items' (Cruse 1992:289), yet, to omit the relational dimension of lexical meaning would be an equally grave shortcoming.



1. third planet from the sun
2. world; this planet as place where humans live
3. realm of mortal existence of humans (opp. *heaven*)
4. (esp. human) inhabitants of this planet (the world)
5. worldly affairs
6. everyday life, *to bring sb back to earth*
7. ground, the surface of this planet
8. material which constitutes the globe's surface (opp. *bedrock*)
9. land (opp. *water*)
10. soil, softer part of land
11. Chem. metallic oxide
12. clay (as adsorbent)
13. one of the four elements
14. clay, substance of human body (opp. *soul*, *spirit*)
15. animal's lair
16. earth color
17. Elec. (in BrE) connection between electrical circuit or device and earth, which is at zero potential (AmE *ground*)

Figure 1. Lexical network for *earth*

Justification for postulating these two dimensions of lexical meaning comes from contextual realizations of words, which are instances of activation of associated concepts. Cruse (1990, 1992) treats words as triggers of concepts, the specifications of the latter far exceeding merely 'identificational' dictionary definitions of the former. Networks represent these specifications and help visualize the aspects of the concepts activated through particular word usages[5]. That is, a word's meaning may be known 'by the company it keeps' (Firth 1968:179), but the knowledge so gained is only valuable if combined with that of the word's meaning potential and the meaning of semantically related words from within the same field.

1. INTRACATEGORIAL TENSIONS. The phenomena will be illustrated with the English lexical category earth. The item will then be seen in relation to other semantically related lexemes, such as ground or land, the two mentioned only briefly, and specifically to *soil*[6].

On the basis of lexicographic definitions (mainly from RHUED 1993 and AHD 1994) the lexical network for *earth* presented in Figure 1 can be constructed (it is best thought of as merely a possible or tentative network, many of whose specifications are probably debatable).

Of immediate interest to us at this stage is the relationship between senses 1 (one of many planets) and 2 (this planet, the world), marked in the network as, in Langacker's terminology, instantiation or specialization (see footnote 3), and in Rice's model as full extension (cf. Rice 1993, Sandra & Rice 1995:97). To see the role of the verbal context in the shaping of the textual meaning of the word[7], let us consider the following excerpt:

> (1) Even today, with the relative downscaling of manned flight into or beyond Earth's orbit, Clarke retains an engaging schoolboy enthusiasm for space as 'the final frontier', in Star Trek language, which he still believes mankind must conquer.
>
> Part of the necessity, he insists, is a 'do or die' situation: not just that the scale of the challenge could unite warring factions on earth, but that sooner or later we will have to face a threat from space which could destroy the human race: the very real risk of a comet or asteroid striking the Earth, just as the Shoemaker-Levy comet collided with Jupiter. (*The Sunday Times*, January 1, 1995)

The two capitalized usages are placed within the undeniably 'cosmic' verbal environment, created by *manned flight*, *orbit*, *space*, *Star Trek*, *comet*, *asteroid*, *collide* and *Jupiter*. The usage in the middle of the excerpt, spelled with a small 'e', is found in the immediate vicinity of *warring factions*. Thus, the text shapes the meaning of the word in two ways: to activate the cosmic sense 1, 'a planet', on the one hand, and sense 2, 'the world', on the other[8].

The following fragment of Martin Amis's novel *London Fields* suggests that the two processes can occur simultaneously, operating on one usage of the lexeme:

> (2) As is the case with the world situation, something will have to give, and give soon. It will all get a lot woollier[9], messier. Everything is winding down, me, this, mother earth. More: the universe, though apparently roomy enough, is heading for heat death. (Amis 1989:239)

The expression *the world situation* activates the 'world' sense, whereas *the universe* brings about cosmic associations. Moreover, the rather intimate expression *mother earth* evokes the notion of this particular, life-giving planet, the home of the humans. In this way the text brings to surface and makes use of the polysemous nature of the lexeme[10]. An intracategorial tension of this sort may be described in terms spelled out by Fuchs (1994:101):

> '[T]he meaning of a polysemous item can be conceived not as a finite list of inter-linked meanings but as a 'potential' of meanings in context, able to be represented as a *multidimensional 'semantic space'* in which the meanings in context cover smaller or greater regions and the interpretation process can

> then be described as the movement which, relative to the contextual elements, constructs a *dynamic* upon this space' (Fuchs 1994:101, influenced by Victorri 1988)

The movement is brought about by 'the action of contextual factors', which may converge, or "draw" the interpretation in the same direction' (Fuchs 1994:103), forming Gestalten, well-formed patterns, typical values, or reference points, identified with nodes in the network[11]. The contextual factors may, however, diverge and cause tension, as in example (2), in which case the word's meaning is 'drawn' into different directions. The meaning, then, may be said to extend over the two network nodes, the tension being part and parcel of the semantic region covered.

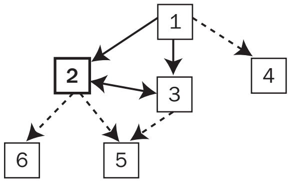
The following fragment of Amis' same novel (1989:332) is a further illustration:

> (3) The change of angle was apparently caused by an unprecedented combination of three familiar effects: *perihelion* (when the earth is at its shortest distance from the sun), *perigee* (when the moon is at its shortest distance from the earth) and *syzygy* (when the earth, sun, and moon are anyway most closely aligned). The confluence made gravity put on weight, slowing the planet's spin and also *slowing time*, so that earth days and nights were now fractionally but measurably longer. 'Yeah cheers,' murmured Nicola, who had only twenty days and nights on earth to go. She tosses *Time* over her shoulder and arrived at her own explanation. Love made the world go round. And the world was slowing up. The world wasn't going round.

Nicola, a murderee who knows when her time will come, has twenty nights and days to go (a) on this planet, one of many heavenly bodies, others being the sun and the moon (sense 1 of earth), (b) in this world, propelled by love's diminishing force (sense 2), and (c) in the present realm of existence before she dies (sense 3). Textual factors, exploiting the word's polysemy, create tensions which 'draw' the semantics of *earth* in various directions, so that it covers the region over three network nodes[12].

2. INTERCATEGORIAL TENSIONS. Given such a wide conception of lexical meaning, it is natural to expect that the semantic region covered by an item in its single usage might overlap with that covered by a related item. In other words, a textually activated sense would provide a link to a related sense triggered by a different lexeme. Indeed, the usage of earth below, also from Amis's *London Fields*, triggers sense 7, 'the ground, surface of this planet':

> (4) I want to feel like the trampolinist when he falls back to earth and to gravity. To touch the earth with heaviness—just to touch it. (ibid. 38)



1. the top layer of the earth's surface, consisting of disintegrated rock and mineral particles mixed with organic matter
2. the ground as producing vegetation or as cultivated for its crops: *fertile soil*, *tilling the soil*
3. a particular kind of earth or ground: *sandy soil*
4. country, land: *native soil*, *an act committed on American soil*
5. the agricultural life: *a woman of the soil*
6. a place or condition favorable to growth; a breeding ground: *poverty provides the soil for crime*

Figure 2. Lexical network for *soil*.

In another novel, *The Information*, the same author uses ground in the following way:

> (5) If Gwyn's first serve hit the net and plopped to the ground or rolled unobjectionably into the tramlines… (ibid 1995:468–69)

Earth and *ground* trigger related but different concepts. What is present in (4) but absent from (5) is that *earth*, accompanied by *gravity*, activates 'planetary' or 'cosmic' associations: the trampolinist falls back as if onto the whole planet rather than merely its surface.

A juxtaposition of sense networks of *earth* and *soil* will help elucidate the phenomenon. Compare the representation of *earth* (Figure 1) with the representation of *soil* (RHUED 1993 and AHD 1994), which might assume the rather tentative shape given in Figure 2.

Example (6) illustrates a typical lexical environment for *soil* with evident agricultural connotations, brought about here by *Viola labradorica purpurea*, *leaf and flower*, *bloom*, *runner at the root*, *seeder*, and *magnolia*:

> (6) By now, Viola labradorica purpurea, purple of leaf and flower, is coming into bloom. It is naturally a runner at the root, and a prolific seeder but, in our sandy soil, and in competition with the magnolia, it only just survives. On heavier, moister soils it can be a menace. (*The Times*, June 3, 1995)

Indeed, the core of the network for *soil* is constituted by 'agricultural' senses 1, 2 and 3, senses 4 and 5 being their further extensions. By comparison, sense 10 of *earth* ('soil, softer part of land'), is often devoid of such connotations, as seen in (7):

(7) They have also removed layers of earth from part of one side of the tank nearest the road and cut a hole, 8 ft by 4 ft, to form the main entrance. (*The Times*, February 4, 1995)

The distinction often holds within the same text. In (8) *earth* is seen as a movable, softer layer of land, whereas *soil* is found in the context of 'cultivation' brought about by *aeration*, *drainage*, *seaweed*, or *retain moisture*:

(8) Years of minimal cultivation, coupled with the compressing effect of the earth-moving equipment… left the heavy clay soil badly compacted in places.

This was rectified with Terralift, a remarkable technique that involves jetting compressed air deep into the soil, creating fissures that… improve soil aeration and drainage. Simultaneously, probes inject flakes of dried milled seaweed, which improves the soil structure and its capacity to retain moisture. (*The Sunday Times*, March 26 1995)

Yet, some contexts show that the nature of the distinction is far from clear-cut. For instance, in (9) *earth* and *soil* are used interchangeably in an undeniably 'cultivating' environment:

(9) Only in the largest urns or planters is garden soil a satisfactory growing medium, and even then it should ideally be mixed with compost. In smaller pots or urns, regular watering will quickly cause garden earth to compact and restrict root growth. (*The Times*, June 10, 1995)

The distinction, it seems, is better spelled out in terms of activation of respective regions within semantic space (cf. Fuchs 1994:101 above), regions which have different conceptual imports. Consider in this vein the following excerpt:

(10) Andreas Panayiotou, a local farmer stopped to investigate a mound of freshly dug earth. 'When I looked more closely, I saw there was a woman's arm sticking out', he said…

She was naked and face down in the red earth, still clutching her blouse…

Certainly, no memorial marks Louise's makeshift grave on the outskirts of Paralimni where she lay buried for two days… The blood-drenched soil has been ploughed over and a nearby house, then a concrete skeleton, has since been completed. *(The Times*, January 14, 1995)

Earth and *soil* may be treated as coreferential, the referent being the upper, removable, soft layer of the solid part of this planet's surface. Yet, the words act like filters or spectacles with glass of different colours: we see the referent in different ways, due to different verbal environments[13]. *Earth* is something which can be dug and heaped into a mound, *soil* is something one ploughs for cultivation. By mentioning ploughed, cultivated soil, as well as the house, the text suggests a return to normality after a brutal murder, whereas earth could perhaps be ploughed merely to obliterate the signs of the tragic event.

Further, activation of concepts may be aided by syntax. (11) comes from Martin Amis's novel *Time's Arrow*:

> (11) All the tulips and roses he patiently drained and crushed, then sealed their exhumed corpses and took them in the paper bag to the store for money. All the weeds and nettles he screwed into the soil—and the earth took this ugliness, snatched at with a sudden grip. (Amis 1991:26)

Both *soil* and *earth* receive motivation for its 'cultivating' senses from tulips, roses, weeds, and nettles. *Earth*, however, apart from sense 10 ('soil, softer part of land'), may also be said to trigger sense 8 ('material which constitutes the globe's surface'), 7 ('ground, surface of this planet'), 1 ('a planet, third planet from the sun'), perhaps even 17 (the British English word for ground: 'connection between electrical circuit or device and earth, which is at zero potential'), 2 ('the world') or 4 ('the humans, the world's inhabitants'). The plants are screwed into the soil, but received by the earth with all its conceptual richness, including metaphysical connotations: the notions of the whole planet, mother earth, the world and all its inhabitants. Vital in such activation is the thematic role of the agent ascribed to *earth*, congruent with its conceptual wealth, as the subject of its clause. It seems that the opposite arrangement of *earth* and *soil* in the text would be hardly possible and definitely less motivated[14]. Because of the activation of such an extensive and diverse region in semantic space, it is sensible to suppose that the scope of such activation may be potentially open-ended[15]. The triggering force of the word's semantic potential activates a large portion of the network with all its internal complexity, much of it arising from the juxtaposition of *earth* and *soil* in near vicinity, coupled with their syntactic distribution. The resulting tension both distinguishes between the two categories and constitutes a link between them. The respective networks for earth and soil are thus part of an overarching supernetwork, or network of networks, which in its totality fills semantic space[16].

Finally, let us consider the following:

> (12) I was born in British Columbia and was shaped by the incredible landscape that is B.C.…
>
> What I've come to understand is that we are the land. I am not saying this in a metaphorical way. With every breath we take, 20 to 40 times a minute, we take the air deep into our lungs and fuse to it. We are 60 percent water. Every bit of food comes from the soil. We are lit-

> erally shaped by the land, and come from the land. You know, the First Nations people say this, and it sounds very poetic, but it's true: 'we are the land' and 'the Earth is our mother'. (*Beautiful British Columbia*, Summer 1999)

The text illustrates how the appropriate conceptual portions are 'carved from' semantic space by the lexemes *land*, *soil*, and *earth*. The words evoke different images and associations: soil suggests a food-providing entity; *Earth* names the provider of life as the substance we walk on, but because of the capitalization also as the whole planet; *land* to an extent embodies the two with further associations with a particular territory or province, in this case British Columbia. Complex as it is, the specification of these meaning regions could be represented as networks in semantic space with textually activated nodes.

2. CONCLUSIONS. The specifications of lexical meaning, it seems, should include two dimensions: (a) the network of associations a word might and does evoke through its textual realizations, and (b) the relationship of a word to semantically related words. Each of these two apects is characterized by semantic tensions: between various senses of a lexical item and between particular senses of various items.

Within a particular lexical category, represented as a lexical network, sense activation may extend over several nodes, all of them important for the actual textual meaning of the word (cf. example (2) above). Since no a priori boundary of the activation can be established and whole networks may potentially be evoked, at the intercategorial level the tensions obtain between whole categories rather than discrete fragments of each. Depending on the specifics of the verbal environment, various nodes of the lexical networks figure more or less prominently. Thus, both lexical meaning and sentence/text meaning seem to contribute to the richness in usage types of individual words (cf. Sandra & Rice's question (1995:99) quoted on the first page of this article).

Lexical networks, which seem very adequate metaphors to represent these phenomena, may be thought of as condensations of usage types in semantic space. Sense activation is in such a view a resultant of textual factors, such as lexical patterns, 'drawing' the meaning of a word into several directions. Through a network of associations the evoked sense activates a whole region of the space. Contexts such as (11) show that the activation may be accompanied by an occurence of a particular word in a specific thematic role. Because of intracategorial and intercategorial tensions, then, we may see lexical meaning as a dynamic entity realized and exploding in texts.

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[1] I would like to thank Henryk Kardela of UMCS, Lublin, Poland and Alex Lubet of the University of Minnesota, Minneapolis for conscientiously reading and commenting on earlier drafts of this paper. Neither of them, however, should be held resposible for any

inadequacies which may remain, nor do they necessarily support the views espoused.

[2] Following Sinclair (1991:171), a lexeme's context is understood here as its verbal context, linguistic or verbal environment, or co-text, that is, in a narrower sense than Firth's context of situation (Firth 1968:14).

[3] Two of these are represented in Figures 1 and 2: *instantiation*, marked with solid arrows, and *extension*, marked with broken arrows (for details see e.g., Langacker 1991:266–72).

[4] The very idea of a network of interrelated senses Langacker ascribes to Tuggy (Langacker 1991:270; cf. also Brugman 1981, Lindner 1981, Brugman & Lakoff 1988). His proposal, however, elaborated further by e.g. Rice (cf. Rice 1993, 1996; Sandra & Rice 1995) constitutes perhaps the fullest and most coherent model of this type.

We are following Brugman's terminology and will consider a lexical network as 'a structured cluster of lexical entries which have the same lexemic head and which are understood as together constituting a category of related senses' (1988:194 in Sandra and Rice 1995:94). Rice distinguishes lexical networks so understood from semantic networks used for 'representing interlexemic relationships within a semantic field' (1996:163). On this understanding, Tuggy's 1996 model is closer to a semantic than to a lexical network. However, confusion may arise, as many authors use the terms differently. For instance, Collins and Loftus (1975) or Järborg (1988), utilizing Quillian's (1966, 1967) ideas of semantic processing, construct lexical networks of interlexemic relationships.

[5] I do not totally agree, however, with Cruse's (1990) idea that several words are mapped onto one concept, but are not identical in meaning if they have identical logical properties. Rather, following Langacker's (1987:60, 76) understanding of linguistic units as involving both form and meaning linked by symbolic relationships, the very difference can be seen *in conceptual terms*: different words activate different concepts *by definition*.

[6] Lehrer and Lehrer (1998:126) point out that 'there is a need to localize the system to avoid semantic holism, and the needed localization is that of a semantic field'. The notion of a semantic field, still not specified in unequivocal terms, is 'delimited by a subject matter' (ibid. 126). In the present analysis, the subject matter may be said to be any aspect of the planet on which we live, for instance its surface, as well as the planet itself.

[7] I follow here Halliday and Hasan's observation that 'each occurence of a lexical item carries with it its own textual history, a particular collocational environment… built up in the course of the creation of the text… that will provide the context within which the item will be incarnated on this particular occasion. This environment determines the 'instantial meaning' or text meaning of the item, a meaning which is unique to each specific instance' (1976:289).

[8] Another potentially important factor is the use of the definite article. However, as can be seen in this and other texts, the English convention allows in this respect for a certain degree of leeway, the first of the two 'planetary' usages being used without the article, the second with it.

[9] Except (12), which comes from a Canadian magazine, all language material is excerpted from British English sources, hence the possible differences in spelling.

[10] Studies have been conducted (e.g. Łozowski 2000) which suggest that a particular lexeme may have two (related) meanings at the same time.

[11] Fuchs seems to avoid the term 'prototype' as theoretically biased, as does Rice 1996, who proposes a neutral notion of the central reference point (CenRP). We depart a little from Rice's conception of CenRPs in that for her their status in the network is privi-

leged, whereas here any node may function as a reference point for identifying textual, instantial meanings of a word.

[12] An additional context-creating factor, deserving a separate treatment, is brought about by the play on words between *slowing time* and *Time*, the title of the magazine Nicola is reading.

[13] Langacker's comment on our 'capacity to structure or construe the content of a domain in alternate ways' (1991:5) comes to mind in an obvious way.

[14] I thank Michael Cummings for this observation. A fuller account of the role of syntax in the conceptualizations we describe awaits further study.

[15] One could spell out the process in terms of figure-ground or profile-base organization (Langacker 1987:120, 181–89), where the figure of activated network nodes, or region(s) in semantic space, is seen against the background of the entire network or the semantic space as a whole. Especially the representational metaphor of 'space' suggests a potentially infinite scope of activation, with possible novel usages, fluid boundaries, and category extensions.

[16] Alex Lubet (e-mail, 24 June 1999) observes that, especially in artistic texts, diction is often dictated by considerations of style, such as a desire to avoid redundancy, a factor perhaps stronger that the nuances of meaning. Lubet's comment, which I find unquestionable, need not be seen as contradictory to the views espoused here. Whatever the *reasons for* the choice of words, meaning cannot, *as a result*, remain unaffected. Regardless of the speaker's/writer's intentions, the words *earth* and *soil* do trigger different, though linked, networks of associations, thereby activating different, albeit related, regions in semantic space.

The ideas have been ispired by Cruse's (1990:394) postulate to construct a network of concepts linked by features to other concepts, whereby full characterization of each concept is possible only through full characterization of patterns of its features or connections with the other concepts. However, Cruse acknowledges (1990:394, 1992:290) that features and relations between concepts are concepts in themselves, as shown by Chaffin and Herrmann 1988 and Chaffin 1992, which complicates the matter.

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* * *

LEXICAL ANAPHORIC AND/OR CATAPHORIC ASSESSORS

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The aim of this paper is to explain the use of lexical items that simultaneously provide an evaluative function as well as an anaphoric and/or cataphoric role. The anaphoric and evaluative roles of the nominal group and clause of which such lexical items form a part are also discussed. While the terms *lexical*, *anaphoric* and *cataphoric* need no explanation, the use of *assessors* and its variants does need some explanation.

The term *assessor/assess(ment)* is used here as to indicate an opinion or view about something. The term *evaluation* is used in this broad sense by Hoey (1983), and also by Hunston as '…anything which indicates the writer's attitude to the value of an entity in the text' (1993:57-58), and as 'to evaluate something is to have an opinion about it, particularly how good or bad it is' (1994:191).

My use of *assessment* here differs from this in two ways. First, I include all thoughtful evaluations, assessments, judgements, conclusions, rulings, opinions and views—and also any actions, advice, recommendations, suggestions, proposals, cautions, warnings or instructions resulting from them. Thus in:

(1) The rifle clubs have banned the use of automatic and semi automatic weapons. *The move* follows the police raids (BBC Radio commentator, June 17, 1967—from Winter, 1977:10)

both the decision to ban and the action implementing that decision are regarded here as assessments. These different types of assessment are an extension of Goodwin and Goodwin's (1992:155) use of *assessment segment*, *assessment action* and *assessment activity*, and also Raz's (1978:128–43) inclusion of actions, decisions and norms as 'conclusions' for which reasons and reasoning can be recognized.

Secondly, I reserve the use of *evaluation* to refer to the wider aspect of Assessment-Basis pairs and related complex patterns of reasoning and justification, with *assessment* being the first part of the binary system. In (1) the first sentence is an Assessment, and the second is the Basis (or reason) for that decision. The verb *follows* is a signal of this binary relation as it 'mediates between the two members of the clause relation' (Winter, 1977:9). I also identify the individual parts of the assessment, as shown in Figure 1 (overleaf). Thus *assessment* has three parts: the Topic being appraised (the referent of the anaphoric nominal for lexical anaphoric assessors), the Appraiser (the person making the appraisal—often implicit as the speaker or writer), and the Appraisal (Martin, 1999) itself. As indicated in (1) and other examples included here, Basis is often—but not always—provided for the assessment.

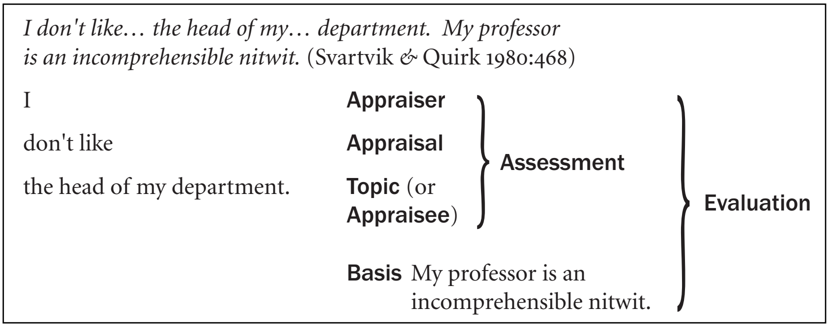
I don't like… the head of my… department. My professor is an incomprehensible nitwit. (Svartvik & Quirk 1980:468)
I
Appraiser
don't like
Appraisal
the head of my department.
Topic (or Appraisee)
Assessment
Evaluation
Basis
My professor is an incomprehensible nitwit.

Figure 1.

Winter (1977:9) refers to *move* in (1) as an 'anaphoric lexical item' with:

> 'The term anaphoric means that, like the pronoun *this* in *This follows the police raid*, the item *move* refers back to the preceding sentence as its source of information. Unlike the pronoun *this*, the item *move* also refers to this information as *the move*'.

That is, the lexical item *move* in the nominal *The move* not only re-enters it into the next sentence so that more can be said about it (Halliday & Hasan 1976:31, Sidner 1983:330), but assesses or characterizes its referent as well. The first sentence of (1) is an assessment (both decision and implementation) of the situation by the executives of the rifle clubs. But the use of the lexical item *move* in the second sentence conveys the writer's assessment of this judgment and related action: it expresses what the writer thinks about the rifle clubs' decision to ban the use of automatic and semi-automatic weapons, and the implementation of that decision.

1. ASSESSIVE AND NON-ASSESSIVE ANAPHORS. We run into practical and theoretical difficulties in deciding whether a lexical item within an anaphoric nominal is assessive or non-assessive. Winter's view that the lexical item move in (1) provides an assessment relies upon its labeling of the preceding action as a 'move'. Clearly, however, such lexical items as *tactic*, *ploy*, *maneuver*, *strategy* and *scheme* provide different views of the action/decision, while others, such as *decision*, *action*, *policy* and *development*, do not convey an expression of assessment. Thus the simple expedient of using a lexical item in this way does not guarantee that an assessment is being provided.

Lexical items are often used in anaphoric nominals purely for cohesive purposes: to clarify the referent, to re-enter a remote referent, to emphasize which item we are referring to, or to stress comparison of referents. In addition, the lexical item in the anaphoric nominal has non-cohesive functions: to place a referent in a class, to identify it, to name it, or even to summarize it—or of course to provide an assessment about it (Jordan 1990:414–16). We thus need tighter criteria for deciding whether a lexical item within an anaphoric nominal is assessive or not. The difficulty is seen by:

(2) Well placed near the six-yard line after another free-kick by Dennis was partially cleared, he shot hurriedly wide. *This lost opportunity* signaled the end of Sutton's promising start. Now Bournemouth began to make their tackles count, pinned Sutton down and stretched their defence with long crosses. *This ploy* brought the vital goal…(*Daily Telegraph*, November 27, 1975:34)

The first anaphoric nominal expresses the indisputable *facts* that the referent was an opportunity and that that opportunity has been lost. Thus it is not assessive as it contains no expression of opinion; there can be no dispute or difference of view on the matter. The inclusion of *lost opportunity* is not cohesively necessary, and its role is to emphasize the 'lost opportunity-ness' of the referent (the whole of the preceding sentence). The writer chose, for rhetorical purposes, to stress the facts in this way, but that does not amount to an expression of opinion as to the nature of these facts. This rhetorical decision is evidence for the conclusion that the writer considered the facts of *lost* and *opportunity* as important concepts that needed to be stressed, but that is another level of assessment, which is not dealt with here. The decision to include and exclude *any* type of information is made based on such writer/speaker assessments of relevance, listener/reader needs and relative importance, but that is beyond the scope of this present analysis.

In contrast, *The ploy* does assess (positively in this context) the referent as being a rather crafty maneuver. It indicates how the writer feels about the preceding set of actions, and it therefore constitutes an assessment. For something to be assessive, it must provide an expression of opinion about the referent—as opposed to classifying, identifying or naming it, which are all matters of fact or stipulation.

Winter's claim that *move* in (1) is assessive is a reasonable one as it is perhaps a metaphorical allusion to moves in games like chess, where moves are not isolated actions but are individual actions taken as part of an overall planned strategy aimed at a long-term goal (a 'step taken to secure object'—COD:790). By coloring the rifle clubs' decision and action in this way, the commentator has provided listeners with a personal assessment of the type of decision/action that has been made. We see a similar contemporary use of the term *move* in:

(3) **Another minister jumps Clark's ship**
Women's equality minister Sue Hammell quit her post yesterday, following two other colleagues and placing Premier Glen Clark's leadership further in doubt. Hammell said in a three-line statement she's been honoured to serve in cabinet and will continue to serve as MLA for Surrey, near Vancouver. *Her move* follows the resignations last week of Joy McPhail as finance minister and Graeme Bowbrick, who quit as Clark's parliamentary secretary. (*The Kingston Whig Standard*, July 20, 1999:36)

We should take the meaning of *move* here as viewing Hammell's resignation as a calculated decision—part of a broader planned series of moves in some sort of strategic political maneuver. [Glen Clark was forced to resign the premiership on August 20, 1999!] Use of *action*, *decision* or *resignation* would not have been assessive, as these items would not have provided any new characterization of Hammell's decision and implementing action. The recognition of *move* as being assessive does not fit too comfortably into Hunston's definitions; there is no 'positive' or 'negative' intimation and no indication of 'value' judgment, although it does express an opinion about the type of action that has taken place. This type of clausal classification, as opposed to known classifications of nominal groups by 'This herb…', 'This mammal…', etc., does provide an assessment.

We also need to consider the possibility of deliberate 'neutral assessments':

(4) Now, however, real-world *pressures* from the retail trade, end consumers, and regulatory agencies are dictating the way producers do business. *These groups* ultimately determine what products are developed, produced, packaged, distributed, sold and supported. *These pressures* are being applied just as the total market for consumer products…is growing slowly (*Journal of Applied Manufacturing Systems*, Winter 1994:9)

The first anaphoric nominal is regarded here as being non-assessive because *groups* is a neutral lexical choice (compared with the positive *collaborators* and the negative *conspirators*, for example). It may be tempting to argue that *any* neutral choice—whether lexical or not—is a form of assessment whenever *other* forms are possible which could have included a positive or negative assessment. Thus in (4), even the selection of *These* instead of *These collaborators* or *These conspirators*, although not obviously or intentionally assessive, could be regarded as a deliberate neutral assessment of the referent because a positive or negative assessment is *not* provided. However, such an approach would mean we would have to accept almost every anaphoric and cataphoric reference as an assessment. As many textual connections serve the sole role of text connection, this approach does not appear useful. Thus here default neutral assessments are regarded as non-assessive unless they are specifically marked as neutral assessments in some way.

The nominal *These pressures* in (4) is clearly not assessive because it includes lexical repetition and therefore contains no new information of any kind. Similarly the use of a synonym for anaphoric purposes is non-assessive:

(5) To successfully link information system investments with real-world business goals, managers of each business unit must give thoughtful attention to their goals. Once *these motivating objectives* are clearly understood…(*loc.cit.*:10)

As *motivating objectives* is a perfect synonym for the referent (*their goals*) and therefore contains no new information, it provides no assessment.

2. NOMINAL SLOTS FOR ASSESSMENT. Complex nominals may have assessments in different slots in the nominal:

(6) Hermann Reichenspurner… was pleased with the *technology*. '*This powerful combination of leading edge technologies*', he said, 'enhances our ability to perform minimally invasive cardiac surgery safely, effectively and with minimal staff and excellent visualization'. (*Mechanical Engineering*, June, 1984:8)

Although the speaker could have used *machine*, *invention*, *understanding*, *device*, or *creation* here (or perhaps *contraption* in a negative context) as nominal head, he chose to use repetition and to add assessments elsewhere in the complex nominal. Compared with the sole nominal *This*, a complex nominal group provides an opportunity for assessment in the attributive adjectival slot as well as the lexis of the nominal head. Thus *This* ***sly*** *move*, *This* ***commendable*** *action*, *This* ***startling*** *development*, etc. all provide an assessment of the referent—in addition to any assessment that may be provided by the lexical choice of the nominal head itself. In (6), assessment is provided by the compound attributive adjective *leading edge* that characterizes the *technologies*.

Complex anaphoric nominals can provide further opportunities for assessment. With the primary lexical assessor as nominal head, we can include assessments in the post triggering of any nominal 'associated' (Christophersen, 1939:73; Hewson, 1972:100–01; Hawkins, 1978:123–31) with the referent. Assessments can occur in the associative lexical choice and its attributive adjective. For example, in the complex nominal in (6), there are assessments or potential assessments in four positions: the main lexical choice (*technologies*), its adjective (*leading edge*), the associated noun (*combination*), and **its** adjective (*powerful*) although in this example assessments occur only in the adjectives. The above example is a 'post-triggered' association as the initiating topic (the 'trigger')for the nominal comes after the new information; pre-triggered forms (e.g., *Its fundamental problem*), untriggered forms (e.g., *The solution*) and multi-stage combinations are discussed later.

3. ANAPHORIC ASSESSMENT IN THE HEAD NOUN AND ADJECTIVE. Clear assessment of the referent in the head noun of the anaphoric nominal is seen in:

(7) Canadians like to think of themselves as a peaceful people. This *conceit*, while neglecting the nation's role in the wars of this century, makes more puzzling the extraordinary continuing interest in the cancellation of the Avro Arrow in 1959. (*Maclean's*, July 1, 1999:34)

The presence of the subordinated clause between the subject and main verb almost requires the use of a noun after *This*, but the lexical choice of *conceit* conveys a negative assessment of Canadians' opinion of themselves, compared with, say, the more neutral (non assessive) *view* or *opinion*. Even when a simple pronoun would suffice syntactically, the speaker may chose a more complex nominal to provide an appropriate assessment. In (6), for example, the pronoun *It* would have been adequate to re-enter the referent, but the complex nominal was used instead to enable positive assessments in the two attributive adjectives to be included.

The assessment may occur in the noun head, the adjective, or both:

(8) *Survival* became an 'overnight publishing sensation', and I myself became an instant sacred monster… Who would have suspected that *this modest cultural artifact* would have got so thoroughly up the noses of my elders and betters? If the book had sold the 3,000 copies initially projected, nobody would have bothered their heads much about it, but in the first year alone, it sold 10 times that number, and suddenly CanLit was everybody's business. The few dedicated academic souls who had cultivated *this neglected pumpkin patch* over the meager years were affronted… (*loc. cit.*:54–55)

The classification of the book *Survival* as a *cultural artifact* provides one assessment and the adjective *modest* provides another. Similarly, for the second anaphoric nominal inclusion of the rather pejorative *pumpkin patch* (instead of, say, *area of study*) is an assessment, and so is the appraisal of *neglected* as its adjective.

With *such* instead of *the* or *this*, the meaning of the nominal is widened beyond that of the textual referent:

(9) On the first day of the strike, a sick baby died after its parents, a newspaper reported, 'knocked in vain at hospitals and surgeries closed by the 900 doctors who have suspended practice'. *Such incidents* led the national media, ordinarily not supporters of socialist causes, to turn against organized medicine and its refusal to obey a law passed by the legislature. *The issue*, *The Globe and Mail* declared, was 'not medicare, but democracy'. *The impasse* was broken when both sides accepted the appointment of a mediator. (*loc.cit.*:35)

While both *The issue* and *The impasse* provide assessments about their referents, *Such incidents* provides at most a weak negative assessment about its referent, and also widens the meaning to include all those incidents like the one just described. Assessment of such broader anaphors can be achieved as associations, such as 'The surprising implications of such incidents…'.

When a lexical anaphoric assessor is startling, or far from obvious given the preceding text, Basis is often provided:

(10) On July 2, 1992, fisheries minister John Crosbie announced the closure of the northern cod fishery at a news conference in St. John's, Nfld. The *irony* was striking. Crosbie was Newfoundland's minister, its champion. His family had become rich through fish. The closing of the fishery was the toughest moment of a 30-year political career. He seemed a traitor to his people. (*loc.cit.*:52)

The nominal *The irony* provides an assessment of the preceding sentence, but there is nothing in that sentence to enable readers to understand the Basis for the Assessment. Thus the remainder of the extract justifies the two assessments: that the closure of the cod fishery by John Crosbie is ironic, and that that irony is striking.

4. ASSESSMENTS IN ASSOCIATED NOMINALS. We saw in (6) that the use of associated nominals (those associated semantically with the referent) provide several opportunities for making assessments. The associated nominal in (6) is a single-stage nominal as the head noun substitutes for the referent and is only one stage removed from it semantically. In contrast, a 'two-stage' (Jordan, 1992:190–91) assessive association is seen in:

(11) American Superconductor Corp., in Madison Wis., designed its PQ DC micro-superconducting-magnetic-energy-storage (SMES) system to lessen the impact of momentary voltage sags or outages affecting industrial drive systems, such as those used in pumps, fans, mixing vats, and continuous process lines. *One of the most critical installations* supporting the reliability of the Defense Megacenter computer is at Tinker Air Force Base in Oklahoma City. (*Mechanical Engineer*, June, 1998:32)

The SMES system is the referent, the first stage of association (untriggered) is *the most critical installation* [of the SMES system], and the second stage is the partitive of the first stage. The adjective *most critical* in the first stage is an assessment indicating the writer's view of the importance of the installation in Oklahoma City.The whole anaphoric nominal has two referents, the second being re-entered into the text through the restrictive *-ing* clause (*supporting…computer*). Multi-stage associations can provide many opportunities for assessment, theoretically two for each stage. As an example, four-stage associations such as 'such an overwhelming response [to the population stress data revealed in our study]' (Jordan, 1992:216–17) provides two assessive opportunities for each of the four stages. For a recent series of discussions on associative anaphora, see Charolles and Kleiber (1999).

The anaphoric nominals in (6) and the second stage of (11) are *post*-triggered associations. Two *pre*-triggered forms occur in:

(12) In recent years, the politicians have extracted *their revenge*: between 1989–89 and 1998–99, the CBC's annual appropriation, voted by parliament, was slashed by 31 per cent—to $629,715,000 from $915,249,000 in constant 1988 dollars. *The corporation's woes* have been accentuated recently by labour strikes, low morale and uncertainty over changes in leadership. (Maclean's, July 1, 1999:37)

The 'trigger' (Hawkins, 1974:123) for the pre-triggered association *their* revenge is the politicians, and *their revenge* cataphorically assess the politicians' actions given in the remainder of the sentence. The trigger for the second pre-triggered association (*The corporation's woes*) is the CBC, and *The corporation's woes* anaphorically assesses the politicians' actions just detailed. That is, the referent for both cohesive associations is the same, but the associations provide assessments from the different perspectives of the politicians and the corporation, as shown by the different triggers and lexical assessors. Although the triggers for many associations are also their referents (e.g., 'The results of this action…'), we see here that they are often separate. This explains the need for a separate labeling system for the lexical triggering and the cohesive roles of associated nominals.

As with (1), the definite article is used for the anaphoric nominal *The corporation's woes* containing the lexical assessor *woes*. The definite article is not as strongly anaphoric as *These* or *This* and will only work as an anaphoric indicator whenthe referent is still clear from the context. The definite article is needed in (12) as *These* would have attached itself to the corporation and not the head noun as in *These problems*, for example. The more condensed form in pre-triggering removes one of the article (or adjective) choices compared with the longer post-triggered form, e.g., 'These *unpleasant* woes of the *weakened* corporation…'

While *The corporation's woes* in (12) *directly* assesses the referent (i.e., the referent is characterized as revenge and woes), instances occur in which the association provides an *indirect* assessment of the referent (i.e., the referent is characterized as the *antonym* of the lexical meaning of the head noun):

(13) There is a host of conspiring theories surrounding Newfoundland's entry into Confederation in 1949. The British colluded with Canada to have the union come about. Ballots in the second referendum were destroyed to produce the desired result. Vast sums of money from Canadian corporations poured into Newfoundland to ensure the result. The pro-Confederation campaign was secretly orchestrated by the Liberal Party in Ottawa.

The truth is simpler. Newfoundland, a dominion in its own right, had effectively declared bankruptcy early in the Great Depression, and Britain had put its dominion status in suspension and named an appointed Commission of Government to run the island's affairs. (*loc.cit.*: 36)

The anaphoric nominal *The truth* is an untriggered association, the trigger being *Newfoundland's entry into Confederation in 1949*. It cataphorically assesses the final sentence of the extract as being the truth, and it simultaneously assesses the preceding discussion as *not* being the truth. In structural terms (Hoey 1983:129, Jordan 1998:719–26), the text provides a 'hypothetical' statement, then implicitly 'denies' it (i.e., intimates that it is not true), and finally provides a correction (i.e., says what *is* true); the final sentence is Basis for the Assessment contained in the preceding sentence. No fewer than five cohesive ties occur in the sentence 'The truth is simpler'.:

(a) The untriggered associated nominal *The truth* provides lexical connection with its trigger.
(b) It antonymically assesses its referent/trigger as not being the truth.
(c) It cataphorically assesses the following statement as being the truth.
(d) The whole sentence is an Assessment, which is followed by the Basis in the next sentence.
(e) The predicative adjective *simpler* comparatively assesses the following sentence as being simpler than the preceding discussion.

The truth in (13) is catanaphoric—a lexical choice that provides (different) assessments of both the preceding and following parts of the text. Other associated nominals can provide catanaphoric assessments of the *same* type:

(14) Passed six years ago, The Energy Policy and Conversation Act (EPACT) was designed to help cut the amount of energy consumed by various industrial and consumer products. The act outlawed certain types of fluorescent tubes, for example, and set standards for both alternative-fuel vehicles in large fleets and low-flow toilets. *Another main provision* required manufacturers to stop offering motors with rated load efficiencies that fall below a specified minimum. (*Mechanical Engineer*, June, 1998:83)

Another main provision [of the EPACT], an untriggered association with EPACT as its trigger, clearly provides a cataphoric assessment of the features about to be given. However, the inclusion of *Another* in the nominal means that the referent (the preceding sentence) is *also* assessed as being a *main provision* of the act.

5. PROBLEM AND PROBLEM-SOLUTION TEXTS. We saw in (12) that part of a text is assessed by the lexical choice of *woes* (a synonym of *problems*) within the pre-triggered association *The corporation's woes*. Identification of text as being a problem is shown by direct substitution in:

(15) All too often, a part designed in three-dimensions is placed at a toolshop that only works from dimensioned part prints. The reverse also happens when a part designer without the right training or equipment does not finish a blend between mating surfaces. The toolmaker is left to create the blend on CAM software or hand file the electrode before electronic discharge machining. *These problems* arise when one person in line doesn't know how the next will use the data provided. (*Journal of Applied Manufacturing Systems*, Winter 1994:35)

The substitute nominal assesses the details in the preceding sentences as problems, and the cause of these follows in the remainder of the sentence. Assessment of a referent as a problem is achieved by many lexical items, some quite general (e.g., *problem*, *woe*, *difficulty*) and others more specific (e.g., *flood*, *drought*, *hunger*).

We saw in (13) that some assessive nominals are contrastively catanaphoric, (a) directly assessing the following text and (b) antonymically assessing the preceding text. This also occurs in problem-related texts:

(16) Undeniably, the merger represents a clash of corporate cultures. *The potential upside*, however, is immeasurable. Automobiles are expensive to design and build, but bigger companies can more easily bear the costs and achieve the economies of scale needed to survive. (*Mechanical Engineer*, June, 1998:4)

With the reinforcing *however*, the untriggered association *The potential upside* (with *the merger* as the trigger) antonymically assesses the preceding sentence as a problem, reinforcing the assessive lexis of *clash* (as opposed to the more positive *combination*). *The potential upside* also provides the positive assessment that there *is* an upside to the merger (modified by the assessive *potential*), and this is followed by the further assessment that the potential upside is *immeasurable*. These three Assessments are followed by Basis for the *immeasurable* assessment in the next sentence. Such important pivotal sentences provide four kinds of cohesion: (a) linking through the associated nominal, (b) anaphoric (antonymic) and (c) cataphoric (direct) assessments in the adjective, the head noun or the clause, and (d) a statement as Basis for one or more of these Assessments.

Problem identification can also occur in pre-triggered associated nominals to cataphorically assess information about the referent:

(17) Of all the existing commercially successful compressors, the device that deviates the least from the chosen design constraints is the rotary sliding vane compressor. *Its fundamental problem*, however, is the severe rubbing contact that occurs between the vane tips and the stator housing wall. (*Journal of Applied Manufacturing Systems*, Winter 1994:25)

The pre-triggered association here uses the possessive pronoun to re-enter the referent/trigger (the rotary sliding vane compressor), and the new information (*fundamental problem*) in the nominal cataphorically assesses the information about the referent given in the remainder of the sentence. The technique is a short way of saying that the referent has a problem and this is what it is.

In (15), (16) and (17) no solutions to the problems are discussed, but a problem-solution pair is involved in (9) as the assessment of the referent as an *impasse* is followed by the solution of accepting the appointment of a mediator; the statement that the impasse *was broken* is a harbinger of the solution. A more direct way of indicating a problem-solution pair is to use the catanaphoric *solution*:

(18) 'We can tune in regularly to stations in Seattle, Oakland, San Francisco, Cincinnati, St. Louis, Denver, etc.', a West Coast reader of Maclean's wrote at the time, but consider it an achievement to get a station at Vancouver, Victoria, Calgary or Edmonton'. The *solution* was state intervention. (*Maclean's*, July 1, 1999:37)

The untriggered associate *The solution* provides an antonymic assessment of its trigger/referent as being a problem—like the antonymic assessments shown earlier by *The truth* (13) and *The potential upside* (16). It also directly assesses the remainder of the sentence as the solution to this problem. The technique of using an untriggered associate in this way leaves the anaphoric assessment vague as being some sort of unspecified problem. On the other hand, the post-triggered form (e.g., 'The solution to this poor reception…') would provide more specific assessments in the head noun and its adjective. The substitute nominal (e.g., 'This *poor reception* was *rectified* by…') allows greater specificity of assessment in the verb as well as the head noun; it also provides an adverbial slot for even further assessment (e.g., 'The poor reception was *largely* rectified by…'). When, however, the first element of the problem-solution pair has already been identified as a problem, the *solution* serves only its cataphoric role.

6. WIDER IMPLICATIONS. The principles of catanaphoric assessment for the Problem-Solution pair leads to wider implications for the 'logical' connections of Purpose-Means, Cause-Effect, Assessment-Basis and Enabler-Enablement, using Winter's (1977:18–27) logical 'Vocabulary 3' words. For example, *The cause* can assess its anaphoric referent/ trigger as an *effect* as well as its cataphoric referent as a *cause*, *The purpose* can indicate that its referent/trigger is an *aim* or *goal* while also assessing the remainder of the sentence as a *purpose*, and *The reason* can imply that its referent/trigger is an *assessment* while also indicating that what is to come is *basis* for that *assessment*. All are untriggered associates with the referent as the implicit (untriggered) head noun of the nominal, and they provide vague assessments of their referents. More specific assessments are provided by the post-triggered form (e.g., 'The cause of these *difficulties*…') or lexical, adverbial and verbal choices (e.g., These *difficulties* were *considerably exacerbated* by…').

Just as we can have a problem without a solution, we can have an assessment without a basis, an effect without a known cause, and a purpose with (at the time of the communication) no specific means of achieving it. However, these complementary types of information usually do appear in pairs and the above analysis applies to all such connections.

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* * *

VERB MEANING AND CONSTRUCTION SETS: THE CASE OF CAUSED NP-PREPP RELATIONS

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In this article we will be concerned with some constructions that can broadly be characterized as expressing 'caused NP-PrepP relations'[1]. In the first section, we will give an informal outline of the semantic domains of the verbs and constructions we will be discussing. We will also touch briefly on the relation between distinct construction paradigms and verb classes, and the descriptive mileage one can get out of this relation. In the second section, we will consider the constructionally determined polysemy of verbs in alternate construals. In the third and last section, we will concentrate on the construction paradigms themselves and set out the grammatico-semantic vectors involved in these 'caused NP-PrepP relations'.

1. the semantic domains: verbs and construction paradigms. The three semantic domains under consideration in this case study are: a. the application of substances (Levin's (1993:50–51) locative alternation),

(1) [Men's daily grooming] includes shaving and spraying cologne on yesterday's work shirt. (cb)[2]
(2) This is the result of volcanic activity in those regions, not of male homosexuals in Sydney spraying themselves with under-arm deodorant. (cb)

b. the encoding of symbols (Levin's (1993:66–67) image impression alternation),

(3) Andy got a dragon etched on his arm but Michael wimped out. (cb)
(4) Think about…having the windows etched with an identification number. (cb)

c. the transformation of material (Levin's (1993:56) material/product alternation):

(5) Rosedale Abbey, built from the stones of a 12th-Century nunnery, provided a memorable stop. (cb)
(6) The harvest had to be carted to the home farm and built into stacks. (cb)

Levin (1993) has noted that some verbs within these domains systematically occur in an alternate frame (examples (1)–(6)), whereas others do not, such as (7)–(9):

(7) Ladle the liquid into this measuring cup. (CB)
(8) It may be easier if you copy the letters on to a piece of paper first. (CB)
(9) I've watched you whip my uncles into well-performing robots. (CB)

and such as (10)–(12) for the other side of the alternation:

(10) Egyptians frequently adorned their horses with decorated bridles and harnesses. (CB)
(11) After completing the test, label each one with the date. (CB)
(12) Citizens were shown how to construct gas masks from kitchen towels. (CB)

For every semantic domain, she thus distinguishes 'alternating' and 'non-alternating' verb classes, for instance for the locative alternation (ibid:50–51):

- alternating verbs: *brush*, *cram*, *daub*, *drape*, *heap*, *jam*, *load*, *pack*, *rub*, *scatter*, *smear*, *spray*, *spatter*, *spread*, *stuff*, etc.
- non-alternating *on*/*in*-verbs: *dribble*, *drip*, *pour*, *ram*, *shovel*, *squeeze*, *stow*, etc.
- non-alternating *with*-verbs: *adorn*, *cover*, *dot*, *fill*, *litter*, *pave*, *stain*, *veil*, etc.

The methodological tenet underlying this approach to verb classification is that all the verbs that display the same syntactic behaviour in such alternations must also share 'pertinent aspects of verb meaning' (ibid:1).

This approach can be related to the descriptive methodology which Gleason (1965) had proposed earlier on, in which systematic paradigmatic variants, or 'agnates',[3] are used as tools for identifying construction types. Continuing this tradition, Halliday (1967, 1994) has used 'agnates' as a heuristic to the *semantics* of a construction: his semantic roles are set up to capture not only features of the syntagmatic structure but also relevant vectors of the construction paradigm (see also Matthews 1984).

Following in the Gleason-Halliday tradition, we will attempt to propose finer-grained semantics for the constructions at hand. For instance, besides characterizing clauses such as (1)–(2) in general as 'caused location' (Pinker 1989, Rappaport & Levin 1988), we also want to capture the *differences* between (1) and (2) (section 2), and, internal to the locative alternation, between the so-called 'stuff' and 'spray' paradigms (section 3).

2. THE POLYSEMY OF THE VERBS IN ALTERNATING CLAUSES. While verb meaning is obviously central to the more lexicalist approaches of alternations such as those introduced above (Pinker 1989, Rappaport & Levin 1988, Levin & Rappaport Hovav 1992), we want to approach the lexical 'status' of verb meanings in these alternations from a more *constructionist* point of view, and this for the following reasons. Lexicalist approaches tend to make the lexical classification the end-all of the

explanation. The general semantic features of the verb classes are assumed to *predict* which verbs alternate and which do not. One of the more questionable consequences of this approach is to regard uses of verbs not predicted by the lexical classification as a sort of 'errors' (Pinker 1989:157).

(13) [from recipes in a magazine article] This version is dribbled with a lively Worcestershire-spiked mayonnaise. (ibid)
(14) He squeezed them [fish fillets] with lemon juice. (ibid)

In a constructionist approach (see Halliday 1967:52 for an early formulation, cf. Goldberg 1994), the construction is viewed as the carrier of a distinct meaning in its own right and it is also seen as the locus of language change, both instantially and systemically (Halliday 1975). Therefore, 'creative' uses such as those cited by Pinker are wholly unproblematic: language users are aware of the semantics of a construction and, in the appropriate context, lexical verbs 'new' to the construction can be given a meaning extension that dovetails with the construction. In this approach, verb classification derives from the 'paradigmatic and syntagmatic relations found in the clause' and 'verb classes represent the potentiality on the part of each verb of entering into each of the sets of relations [i.e. paradigmatic and syntagmatic] involved' (Halliday 1967:52).

With regard to the lexical status of the verbs in the alternations, our position is that each individual construction type defines a specific sub-meaning of the verb. Closely 'agnate' constructions trigger off a closely related subsense of the verb. Constructions which are part of a distinct construction paradigm activate more substantially different subsenses in the verb. Still, as long as these subsenses are governed by one general 'schematic' meaning, they are part of a network of polysemous verb meaning. We can illustrate this with observations from our previous research involving the verb *spread*.

In *he spread the butter on the sandwich* the Agent and the substance that is relocated are profiled. In *he spread the sandwich with the butter* the substance is still part of the general scene, but the focus is on the location on which the substance is spread. The two meanings of the verb in **locative** constructions can therefore be described as '**dispersion**'—when the particles of the substance are relocated—and '**coverage**'—when the focus is on the location to which a layer of something is applied (Laffut 1998a). 'Dispersion' and 'coverage' are terms that cover the two senses of all the alternating locative verbs: they all express the dispersion of something, either a liquid or a mass, or a number of things, such as *raisins* in *he scattered raisins over the dish*. On the other hand, they also express contact between the substance and a certain location, which due to the action is covered with the substance[4].

The verb *spread* can also occur in a different alternation, viz. the ergative one (cf. Levin 1993:27ff) as in:

(15) a. The fire spread. :: b. The breeze spread the fire.
(16) a. The infection may spread. :: b. Skin contact may spread the infection.
(19) a. Rumours spread. :: b. Malicious rivals spread rumours.

The general semantics of this alternation involves a 'semi-autonomous process', as in (15)a, (16)a and (17)a, and the 'instigation of that process', as in (15)b, (16)b and (17)b (Davidse & Geyskens 1998). From these constructional meanings derive lexical restrictions on the nominals that can occur with ergatively used verbs. The ergative uses of *spread* are found mainly with fire and gases (15), infectious diseases (16) and 'catchy' semiotic constructs (17), because these activate constructional meanings compatible with the general ergative schemata, such as the 'expansion' of fire, disease or gossip, and its being fuelled by external factors.

It can be noted that the subsenses *within* the alternations are semantically closer to each other than those *across* the alternations. Yet, they are all 'kept together' by one abstract, superordinate schema such as 'expansion of the particles of a—concrete or abstract—mass' in the case of *spread*.

From the lexical end, our position can be supported by Langacker's (1990:193–196) views on the polysemy of lexical verbs. He holds that the lexical meaning of verbs, like all frequently used lexical items—consists of a network of polysemously related senses. He illustrates this with the two closely related examples:

(18) She heard the piano.
(19) She heard the sound of the piano.

Hear has one schematic 'auditive perception' meaning, two distinct instantiations of which are activated in (18) and (19). In (19) *hear* designates the relation between perception and sound, in (18) that between perception and the source of the sound. Thus, two distinct conceptual 'substructures' (Langacker 1990:195) between the verb and its participants are profiled.

What then are the two main subschemata involved in the other two alternations under consideration? The verbs of the **image impression** alternation can, on the one hand, describe an act of **semiosis**, the creation of a sign: a certain symbol—like a dragon in (3), or a baker's monogram in (20)—is given a material form.

(20) Indeed, the earliest known trademark is a baker's monogram stamped on a loaf. (CB)

On the other hand, *etch*, *inscribe*, *embroider*, etc. can also express the **distortion** of the surfaces being etched, inscribed or embroidered, as in (4) or (21). For instance, the surfaces of the slippers in (21) were modified where they were embroidered.

(21) Prince Albert's slippers, believed to have been embroidered with a rose and a thistle by Queen Victoria nearly 145 years ago, sold for 1,840. (CB)

The verbs of the **material product** alternation, then, can have either a **construction** or a **transformation** meaning. *Build*, *bake*, *forge*, etc. can be used to express the construction of something, like a house, a cake, a compromise. This is for most verbs the most entrenched meaning. But they can, with a polysemous extension from (5) to (6), also express the transformation of material in order to construct something. For example, *I baked the pastry into a pie* entails a substantial change in the material constituted by the pastry. The 'transformation' is not always so pronounced, however. In the case of building the harvest into stacks (example 6), the material is altered only in the sense that it is rearranged.

Thus, all these alternations illustrate the principle of constructionally determined polysemy in the lexical verbs. The patterns of polysemous specialization and/or extension are wholly systematic and predictable from the constructions. Not only does the construction single out *one* specific lexical meaning of every verb, it also always activates the *same* sort of subsense in all these verbs.

While we advocate a primarily constructionist approach, we still recognize that the relation between construction and lexical verb is a *dialectic* one, in that the semantics of the verb define the coordinates within which processes of extension and specialization may or may not take place. Such a dialectic approach may also go some way towards explaining the inability of certain verbs to participate in the alternations. It seems that these 'non-alternating' verbs tend to be *more specific* than the alternating ones, both in terms of their predicated lexical meaning and their collocational potential. The alternating ones appear to have a more encompassing schematic meaning, which may be instantiated in either of the alternating subsenses, whereas the non-alternating ones lack the broader general schema and hence also one of the specific subsenses. For instance, *copy* in (8) evokes the 'semiosis' meaning, rather than the 'distortion' meaning, which may explain why it fails to occur in 'distortion' alternates. In contrast, verbs such as *engrave* do have the broader general schema 'material impression of symbol', of which either the 'semiosis' or the 'distortion' sense may be profiled in the corresponding alternates.

Similarly, verbs such as *drip* and *dribble* lean much more to the 'dispersal of particles' meaning, than to the 'coverage' meaning: they basically evoke a way in which the fluid is transferred. Hence, they occur overwhelmingly in the 'dispersal' type of construction. However, in certain cases the alternate construction can also be imposed on these verbs, which then take on a meaning appropriate to that construction. Locative *dribble*, for example, occasionally also occurs in the *with*-construction (Recall examples (13)–(14) cited by Pinker (1989:157) as 'ungrammatical'.)

(22) Spoon on wine, dribble peppers with oil. (CB)

The extremely low frequency (*dribble with* occurred only once in a corpus of 20 million words) shows that the coverage meaning is not normally part of the semantic make-up of *dribble*. However, its semantics appear sufficiently elastic and marginally collocatable with a Patient/Location, to allow for a meaning extension compatible with the *with*-construction. Attested examples of similarly 'marked' constructions, triggering meaning extensions in the lexical verb unpredicted by Levin's (1993) classification, are:

(23) And requires bizarre, beautiful, outrageous, bold and exciting creations be designed and adorned on the bodies of willing models. (CB)
(24) She would ride bigger ponies, douse all the ketchup she wanted on her hamburgers, and maybe even talk to bears like Goldilocks. (CB)

What the above has shown is that there is a dialectically motivated relation between verb and construction, between lexical and constructional meaning. Verb meaning generally sets out the coordinates for whether or not a certain construction is possible, but on the other hand the construction can, when the lexical verb is not too specific conceptually and collocationally, be imposed on the verb, as with *dribble peppers with oil*. Hence, the membership of classes of lexical verbs should not be reified and, importantly, they are classes of verb senses, not of verbs as such.

3. THE SEMANTICS OF THE CONSTRUCTION PARADIGMS. In this last section, we will look more closely at the semantics encoded by 'the syntagmatic and paradigmatic relations' (Halliday 1967:52) in the clause types we are concerned with. While there has been a lot of theorizing about 'transitive' clauses (involving an Agent and a Patient), few attempts have been made to give a coherent account of these 'compound-transitive' structures (involving an Agent and two 'patientive' participants). We propose that the locative, image impression, and material/product structures, and presumably others like them, can be analyzed as **caused relations**, with the relational component understood in the sense of Halliday (1994).

In the entire literature on case and semantic relations, Halliday is one of the few who has not restricted the picture to semantic models of action and event structure, but who has also done justice to the specificity of the relational domain. He interprets it in terms of a semantic space, or topology, which ranges from 'being' to 'having', i.e. from 'semiotic' to 'possessive' relations and has an extended in between area of 'circumstantial' relations. The semiotic relations construed by English clauses are 'instantiation' and 'representation', while the possessive clause configurations are expressive of various forms of 'part-whole' schemata (Davidse 1992, in press). Circumstantial clauses appear to construe all sorts of 'contiguity'—relations such as spatial, temporal and causal contiguity. As we will argue, the construction types we are concerned with can be done justice only by invoking both semiotic and contiguous/possessive schemata.

There is already something of a tradition for interpreting compound-transitive constructions as 'caused relations'. Thus, so-called complex-transitive clauses are commonly analysed as the causation of being (Quirk et al 1972) and ditransitive ones have been interpreted as the causation of having (Davidse 1996).

	ATTRIBUTIVE	IDENTIFYING
semiotic	• *He is a sir* • *They made him a sir*	• *He is the leader* • *They made him the leader*
circumstantial	• Silber has promised to use the managerial skills, which helped build BU into a national institution.	• They built Shell into the number one oil company in the world.
	• A box decorated with Monty Python-type surreal graphics.	• I will have your name inscribed in the chapel's book of remembrance.
	• Spray fruit trees with tar oil wash in still weather, to kill overwintering eggs of insect pests. • Many of the houses had been built from stones removed from the ruins of the Ma'rib dam.	• We'll scatter Andre's ashes over his ranch and raise a toast to our beloved friend. • They built these stacks from the sheaves we gathered yesterday.
possessive	• *They gave him a car.* • *He has a car.*	• *He bequeathed all his silver to his children.* • *His children own all the silver*

Figure 1. The constructions in the semantic space of circumstantial relations.

(25) a. They made him a sir. – b. He is a sir.
(26) a. They gave him $100. – b. He has $100.

In (25)a, an Agent can be said to perform a process on the Patient, *him*, which results in him becoming an instance of the 'sir' category; and in (26)a the Agent causes *him* to have *$100*. Clause (25)a agnates with (25)b, and clause (26)a with (26)b.

What we propose is that the locative, image impression and material/product constructions can be analysed along parallel lines: the Agent causes a specific relation between the two non-agentive constituents, but the 'relational' component is basically **circumstantial**. Still, some constructions are semantically closer to the semiotic end, with its opposition between instantiation and realization, whereas others involve spatial contingency and part/whole relations, which brings them closer to the possessive end. The schema in Figure 1 visualizes the location of the constructions in question within the semantic space of circumstantial relations.

Let us start with the **material/product** constructions, whose subtypes occupy various positions in the circumstantial domain, either more towards the semiotic or more towards the locative/possessive end. In the top left hand corner, we find *build BU into a national institution*, which, we propose, expresses '**caused instantiation**'. This type of construction comes very close to the complex-transitives, with which they can systematically be replaced: *Silber has promised to use the managerial skills, which helped make BU a national institution*. In both constructions, and in their non-caused counterpart, *BU* is construed as an 'instance' of the category 'national institution'. The nominal *a national institution* predicated of BU is indefinite and non-referential: it expresses that *BU* is an 'arbitrary' instance of the type (Langacker 1991:68) designated by the nominal head and its modifier, viz. 'national institution'.

In contrast to this, *the number one oil company* in *they built Shell into the number one oil company in the US* is a definite, referential nominal. This is typical of **identifying** clauses, where one entity can identify the other only when they both designate specific individuals, located in specific spatio-temporal domains. As pointed out by Halliday (1967:70; 1985:115), construing two entities as standing in an identifying relation also presupposes that they stand in a relation of '**representation**' to each other, such as that between actor and role, signifier and signified, form and function. Non-caused identifying clauses can be reversed: because their Complement is referential, and typically definite, it can also be turned into the Subject of an agnate clause: *Shell is the number one oil company in the US* ↔ *The number one oil company in the US is Shell*. This reversibility criterion does not apply to clauses expressing caused identification, because the order of the two non-agentive constituents is fixed by the construction. Here, the determiner structure and referential status of the nominal are the only formal reflexes of whether a 'representation' or 'instantiation' relation is being expressed.

More towards the 'possessive' end of the continuum, where the distinction attributive-identifying is less clearcut, we find material/product sentences like (27)a. This type does not have a systematic relation with complex transitives such as (27)b and its non-caused agnate is (28).

(27) a. They built the sheaves into stacks. – b. *They built the sheaves stacks.
(28) The sheaves formed a stack.

Rather than an 'instantiation' relation, it construes a **part/whole** schema, in which the Material corresponds to the parts and the Product to the whole. It is this type of clause that is usually considered when the material/product alternation is described; the 'semiotic' type is mostly not distinguished. Such overlooked distinctions constitute another argument for applying agnation methodology more systematically (as in (27)–(28)), beyond binary alternations.

Next, we will look at the **image impression** constructions, which express the impression of a symbol on a material medium. In Figure 1, they have been placed in between the 'semiotic' and 'possessive' end, because their semantics invoke both the semiotic and the locative/possessive. The Agent is not simply performing a material action, but an act with semiotic consequences, as in:

(29) One of my punks has 'I love Princess Katya Galitzine' tattooed on his back in Gothic script. (CB)

On the other hand, it is characteristic of the 'image impression' construction that there is a special emphasis on the material medium being 'worked on'. As a result, the construction as a whole links up with the locative alternation. Both locative and image impression constructions express a spatial contingency relation between, on the one hand, the location onto which the substance is sprayed or onto which the image is made, and, on the other hand, the thing sprayed or drawn.

The last remaining construction type is the **locative** one, which has been studied extensively in the literature. Using agnation methodology, we will attempt to set out the full 'locative' construction paradigm and show what is to be gained from such an approach, over and above a binary alternation approach. As advocated by Matthews (1984:265ff) and Halliday (1994:xxxii), grammatical paradigms should be set up to reflect the proportionalities between related clauses. Such paradigms are not simply 'given' by the language facts, but embody the analyst's interpretation of the 'vectors' governing systematic grammatical variation. Halliday (e.g. 1991), moreover, has always stressed that frequency of occurrence is an important symptom of the relative markedness of cells in a paradigm. By investigating this relative frequency in a corpus, a crucial methodological link is forged between this method of grammatical description and empirical corpus research.

The main point that is revealed about the locative paradigm by this approach is that it is characterized by an internal grammatico-semantic split between two subparadigms, each of which have their own 'directionality' (Figure 2, overleaf). The main formal marker distinguishing the two subparadigms is the preposition: subparadigm I (with verbs like *load*, *pack*, *jam*, *stuff*, *load*) has *in*, while subparadigm II (with verbs like *spray*, *smear*, *brush*) has *on*.

Semantically, this break corresponds to a difference in which entity is the primary 'Affected' as well as the reference point in the relational component. In subparadigm I, the Agent primarily targets action on the container into which things are transferred, i.e. the 'Location', whereas in subparadigm II, the Agent's action is targeted on the 'Locatum', the thing being relocated (such as *fluids or substances*). As a consequence, the relation of spatial contingency brought about takes the Location as its reference point with *stuff*-verbs (Subparadigm I), whereas it is the Locatum that serves as reference point with *spray*-verbs (Subparadigm II).

The distinct lexical semantics of the *stuff*- versus *spray*-verbs have already been recognized in the literature: the first class is about putting things in a container, whereas the second is about covering surfaces with substances (Levin 1993:50). What has, to our knowledge, not been pointed out so far, is the different construction paradigms associated with each class. Inspired by Halliday's (1994) paradigmatic analysis of non-caused relational structures, we have taken the following vectors into account: (i) unmarked versus marked information focus (set out vertically); (ii) postverbal or clause-final position of the primary Affected (set out horizontally). Table 1 indicates the frequency of occurrence of each cell in the paradigm[5].

As predicted by Halliday (1991), statistical and functional markedness turn out to go hand in hand. The quantitative instantiation of the cells is to a fairly large extent determined by information distribution. The a- and b-cells, which respect the unmarked Given-New word order, are significantly more frequent than the c- and d-cells with marked non-final information focus. Still, the difference between a and b among themselves shows that this explanation by itself is inadequate and needs to be supplemented by the factor 'position of the primary Affected'. The b-cells may be textually unmarked, but they have the primary Affected in clause-final position. The a-cells, on the other hand, are unmarked in all respects: they have information focus on the clause-final participant, and the primary Affected iconically occurs just

Subparadigm I	a. The prosecution has suggested the knapsack was stuffed with **bloody clothing Simpson wore**. (CB)	b. Elisa took off her gloves and stuffed them in **the apron pocket**. (CB)
	c. You mix that with the aubergine puree and stuffs [sic] **pancakes** with it. (CB)	d. Before long, the mattress was alive with scurrying vermin mice as well as rats. So she stuffed **telephone books** into the holes in the mattress and tried to ignore her bedfellows. (CB)
Subparadigm II	a. It can be sprayed directly onto **towels, curtains or sheets**. (CB)	b. Last year Carmel sprayed **tissue paper** with those colours. (CB)
	c. Everyone kept taking the mick out of her and spraying **this water** on her. (CB)	d. When your land is sprayed with **Agent Orange** and you survive […] you may have some strange disease. (CB)

Figure 2. The locative alternation: full construction paradigm.

Subpar. I	a. 62% (67)	b. 22% (24)	Subpar. II	a. 84% (119)	b. 13% (18)
	c. 14% (15)	d. 2% (2)		c. 1.5% (2)	d. 1.5% (2)

Table 1. Quantitive instantiation of the different cells.

after the verb, where, as reference point of the circumstantial relation, it also comes iconically before the 'anchored' participant.

Our results strongly suggest that the 'container' constituent (the Location) is the more inherent Affected of *stuff*-verbs, while the Locatum (the substance) is the more inherent Affected of the *spray*-verbs. From a lexical point of view, it seems to us that there are interesting perspectives here for collocational corpus research. For instance, the question could be investigated whether there are stronger collocational ties between 'container' and *stuff*-verbs on the one hand, and between 'substance' and *spray*-verbs on the other.

4. CONCLUSION In this article, we have presented some results of a pilot study about the semantics of 'caused NP-PrepP relations', more specifically, the locative, image impression and material/product constructions. Our approach is 'constructionist' in the sense advocated by Halliday, i.e. one which sees clausal constructions as the primary units construing a linguistic interpretation of experienced situations and which also regards these constructions as the locus of language change. Moreover, following Gleason's 'agnation' methodology, this approach views clause grammar as constituted both by syntagmatic—or structural—and paradigmatic—or agnation—relations. It is within this broadly 'constructionist' approach that lexical issues such as the polysemy of the lexical verb in agnate constructions and the collocational restrictions on the verb's participants can be investigated.

In terms of descriptive results, we have formulated the constructionally determined schemata of verbal polysemy in the three alternations under discussion: the locative alternation involves 'dispersal' and 'coverage', the image impression alternation 'semiosis' and 'distortion', and the material/product alternation 'construction' and 'transformation'. We have also argued that the semantics of these alternations, and, we suspect, others like them, can best be analyzed systematically in terms of 'caused relations', invoking either the more 'semiotic' or the more 'locative/possessive' end of the circumstantial domain, as envisaged by Halliday. Finally, we have shown that, in order to reveal finer-grained grammatico-semantic distinctions, one has to pursue a more systematic paradigmatic description, which goes beyond a purely binary alternation method. In this way, we have distinguished a semiotic and a possessive variant of the material/product construction, and a 'stuff' versus a 'spray' subparadigm within the locative paradigm.

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[2] The text examples quoted from the COBUILD corpus in this article are all marked with (CB) and are reproduced with the kind permission of HarperCollins Publishers.

[3] Gleason (1965:199) used the kinship term 'agnate' (i.e. related on father's side) to refer to a systematic and regular variant of a specific grammatical structure.

[4] The general term 'coverage' should not be taken to mean that the surface or interior is always completely covered or affected by the entity (see Laffut 1998a).

[5] By setting out the 'locative' paradigms in this way, intriguing parallelisms can be observed with the 'dative' constructions. Davidse (1996) has offered a paradigmatic description of 'dative' constructions, which also takes information focus and position of the primary Affected as the main vectors, and brings in frequency counts as indications of markedness. This description revealed two distinct classes of dative verbs: (1) those in which the Agent targets action on the Dative as primary Affected and which construe a 'meronymic' model of ditransitivity (as in *they feed the lions raw meat*), e.g. *feed*, *give*, *lend*, *tell*, *teach*, *show*, *reimburse*, *grant*, etc. (cf. the *stuff*-verbs of the locative paradigm); (2) those in which the Agent targets action on the Patient as primary Affected and which construe a 'transfer' model of ditransitivity (as in they administer proteins to the patients), e.g. *administer*, *donate*, *extend*, *mention*, *explain*, *demonstrate*, *refund*, *extend*, etc. (cf. the *spray*-verbs of the locative paradigm).

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ICELANDIC AUXILIARIES *HAFA* AND *VERA*: A SEMANTIC ACCOUNT

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1. INTRODUCTION[1]. In the lexical semantic literature the availability of auxiliary selection has often been adduced in support of the existence of syntactic configuration: unergative and unaccusative verbs. One general view shared by researchers is that the auxiliary BE is considered to be a signal of unaccusative status and HAVE is considered to be a signal of unergative status of the main verb (Burzio 1986, Levin & Rappaport Hovav 1995). This statement is often validated by referring to certain constructions. For example, the locative inversion construction is taken as a diagnostic for surface unaccusativity of an English verb like *run* which is compatible with that construction only when a directional phrase co-occurs. The contrast in (1) serves as evidence that verbs whose argument remains at the postverbal position are classified as unaccusative, and verbs whose argument is positioned preverbally are classified as unergative. The reason (1)a is ungrammatical is that *run* in this example is an unergative verb which must have an external argument at the preverbal syntactic position. The grammaticality of (1)b is ascribed to the unaccusativity of the verb *run* whose preverbal position is not filled by its argument at its predicate argument structure.

(1) a. *In the room ran the crying boy.
    b. Into the room ran the crying boy.

This syntactic distinction is also associated with the availability of the *there*-construction in English which only allows unaccusative verbs such as *appear* but not unergative verbs such as *play*.

(2) There appeared a ship on the horizon.
(3) *There played children in the sandbox.

The behaviour of *run* in (1)b and *appear* in (2) points to the existence of unaccusativity, since their single argument remains in the surface object position. It is assumed that auxiliary selection presents deep unaccusativity of main verbs and the contrasting behaviour, as demonstrated in (1), correlates with the selection of auxiliaries. In Dutch, for instance, verbs which normally select HAVE can take BE when they appear with the directional phrase, as shown in (4). Following this, it is hypothesised that the alternation of syntactic verbal classes underlies the possibility of the selection between HAVE and BE; unergative verbs are compatible with

HAVE, whereas unaccusative verbs are compatible with BE. Examples below are cited from Zaenen 1993:136 ([22]a, b).

(4) a. *Hij heeft/*is gelopen.*
He has/is run
'He (has) run'
b. *Hij ?heeft/is naar huis gelopen.*
he has/is to house run
'He (is) run home'[2]

Icelandic provides several counterexamples in many respects which bring seriously into question the proposal built on the syntactic status of unergative and unaccusative configurations. First, in Icelandic the contrast, as shown in (1), is morphologically realised but not configurationally; the distinction, if any, between unergative and unaccusative cannot be made.

(5) a. *Í herbergi-nu hljóp grátandi barn.*
in room-the.DAT ran screaming child
'*In the room ran a screaming child'
b. *Í herbergi-ð hljóp grátandi barn.*
in room-the.ACC ran screaming child
'Into the room ran a screaming child'

Second, both HAVE and BE can appear with a directional phrase like *til hússins* 'to the house'. The only difference is that (6)a and (6)b are assigned slightly different sentential meanings; (6)a expresses an 'experiential perfect', while (6)b epresses 'perfect of result' (see discussion in 2.3 for these notions).

(6) a. *Jóa hefur hlaupið (til hússins).*
Jóa has run to house.the
'Jóa (has) run home'
b. *Jóa er hlaupin (til hússins).*
Jóa is run to house.the
'Jóa (is) run home'

Third, verbs of appearance or existence are generally considered unaccusative verbs, taking only BE (see Levin & Rappaport Hovav 1995:149). However, not all Icelandic verbs of this class are amenable to this generalisation; verbs such as *búa* 'live', *gnæfa* 'extend', *vera kyrr* 'remain', *vera til* 'exist' are only compatible with HAVE[3].

(7) *Jóa hefur/*er búið á Selfossi.*
Jóa has/is lived in Selfoss
'Jóa (has) lived in Selfoss'

All these empirical facts clearly indicate that auxiliary selection in Icelandic has no direct connection with the syntactic configurations, contrary to the previous proposal, but with 'something else' that may not, in the first place, be syntactic in nature.

My purpose in this paper is to highlight that some very basic semantic principles underlie the behaviour of Icelandic auxiliaries *hafa* 'have' and *vera* 'be'. I will first present the relevant Icelandic data, pinpointing the various behaviours of *hafa* and *vera*. For convenience I make, where necessary, comparison of Icelandic with Dutch, a language often referred to with respect to auxiliary selection. I will then look at two accounts of auxiliary selection in the recent literature, both of which are shown to be inappropriate for the explanation of the exact behaviour of Icelandic auxiliaries. My analysis goes, in essence, along with the basic idea put forward by Lieber and Baayen (1997) who propose a single semantic feature ['Inferable Eventual Position' or 'State'] for auxiliary selection in Dutch, though it differs significantly in proposing three fine-grained semantic components which are called 'recessional motion', 'directed motion', and 'achieved endpoint'. I also argue, though briefly, that this semantic account is more tenable than the account based on the agreement fact between subject and past participle (Sigurðsson 1993). In other words, the agreement will be shown to be merely a consequence of the selection of auxiliaries but cannot be considered to be a genuine explanation of why a particular auxiliary is chosen.

2. THE DATA

2.1. AGREEMENT. In the auxiliary construction in the present perfect, Icelandic past participles agree with the subject in number and gender when the auxiliary *vera* is selected, but the agreement is absent when *hafa* is selected. That is to say, verbs with *hafa* always take a form of neuter and singular regardless of the number and gender of the subject. This is exemplified by (8) and (9) with the verb *fara* 'go'.

(8) a. *Hann er farinn.*
he.MASC.SING is gone.MAS.SING
'He (is) gone'
b. *Hún er farin.*
she.FEM.SING is gone.FEM.SING
'She (is) gone'
c. *Það er farið.*
it.NEUT.SING is gone.NEUT.SING
'It (is) gone'
d. *Þeir eru farnir.*
they.MAS.PLUR are gone.MAS.PLUR
'They (are) gone'
e. *Þær eru farnar.*
they.FEM.PLUR are gone.FEM.PLUR
'They (are) gone'

(8) f. *Þau eru farin.*
they.NEUT.PLUR are gone.NEUT.PLUR
'They (are) gone'

(9) a. *Hann/Hún/Það hefur farið.*
he/she/it.SING has gone.NEUT.SING
'He/She/It (has) gone'

b. *Þeir/Þær/Þau hafa farið.*
they.PLUR have gone.NEUT.SING
'They (have) gone'

2.2. DISTRIBUTION. Almost all the verbs in Icelandic take *hafa* and a limited number of verbs can take *vera* in addition to *hafa*. Verbs such as *hanga* 'hang' take both, whereas *aka* 'drive' does not take *vera*, as illustrated in (10) and (11), respectively. It appears that one exception is the verb *hópa* 'crowd/herd' which only takes *vera* but not *hafa*, as shown in (12).

(10) a. *Fiskurinn hefur hangið.*
fish.the has hung
'The fish (has) hung'

b. *Fiskurinn er hanginn.*
fish.the is hung
'The fish (is) hung'

(11) *Jóa hefur/*er ekið.*
Jóa has driven
'Jóa (has) driven'

(12) *Hestarnir *hafa/eru hópaðir.*
horses have/are crowd/herd
'The horses (are) herded together'

All transitive verbs take *hafa* in Icelandic. In Dutch transitive verbs can also take BE only when the sentence particularly emphasises the result of an event, as in (13) (see Lieber & Baayen 1997:811). In Icelandic, by contrast, transitive sentences are not used in perfective constructions, but only in those that refer to a past event, as in (14).

(13) *Ik heb/ben mijn sleutels verloren* (activity/result)
I have/am my keys lost
'I have lost my keys' (lit.: 'I (have/am) lost my keys)

(14) *Ég hef/*er tapað lyklunum.* (fact in the past)
he have/am lost keys.the
'I have lost the keys'

Interestingly, almost all Icelandic verbs which end with the affix -*st* uniformly select *hafa*, e.g., *nálgast* 'approach', *ferðast* 'travel', *gerast* 'happen', *komast* 'come to the end', *farast* 'sink', *teygjast* 'extend', *birtast* 'appear', *hefjast* 'begin, start', *farast* 'perish', *takast/heppnast* 'succeed', *hópast* 'crowd/herd', etc. This might be correlated with the historical fact that -*st* was an accusative reflexive *sik* in Old Icelandic. In fact, all reflexive verbs in modern Icelandic take *hafa*, as illustrated in (15).

(15) a. *Maðurinn hefur/*er baðað sig.*
man has bathed himself.ACC.SING
'The man (has) taken a bath'
b. *Börnin hafa/*eru skemmt sér vel.*
children have amused themselves.DAT.PLUR well
'The children (have) amused themselves well'
c. *Börnin hafa/*eru skammast sín.*
children have ashamed themselves.GEN.PLUR
'The children (have) felt embarrassed'

2.3. ASPECT. While Dutch makes a clear aspectual distinction between HAVE and BE, in Icelandic *hafa* expresses activity without reference to aim as well as an aimed or directed action, while *vera* is confined only to the latter. Consider verbs like *lopen* 'walk' and *ganga* 'walk', as shown in (16)–(20); *hafa* and *vera* both express a directed action (see (19) and (20)). Dutch examples are from Fontein and Ter Meer (1994:97).

Dutch:
(16) *Hij heeft/*is in het park gelopen.* (aimless action)
he has/is in the park walked
'He (has) walked in the park'
(17) *Hij *heeft/is naar het park gelopen.* (directed action)
he has/is to the park walked
'He (is) walked to the park'

Icelandic:
(18) *Hann hefur/*er gengið um í garðinum.* (aimless action)
he has/is walked around in garden-the
'He (has) walked around in the garden'
(19) *Hann hefur gengið til garðsins.* (directed action)
he has walked to garden.the
'He (has) walked to the garden'
(20) *Hann er genginn til garðsins.* (directed action)
he is walked to garden.the
'He (is) walked to the garden (but is no longer there)'

2.4. CONSTRUCTIONAL MEANING. Icelandic differs significantly from Dutch in that the selection of auxiliaries imposes two distinct constructional meanings. Following Comrie (1976:56–59), I call them 'experiential perfect' and 'perfect of result', respectively. As he mentions (ibid 59), this distinction roughly corresponds to the difference between English sentences such as *He has been to Iceland* and *He has gone to Iceland*. The first sentence expresses 'experiential perfect' in the sense that it is implied that the denoted action occurred at some distant time at one or more than one occasion in the past; it is not known where he is now or he may already be back in the original location. By contrast, the second sentence expresses 'perfect of result' in the sense that there is an implication that the denoted action happened in the recent past and it has a present consequence while the speaker is making a statement; for instance, he is not here any longer or he may have stayed in Iceland. This contrast is shown by Icelandic examples (21) and (22). Note that the difference is indicated by the different use of auxiliaries in Icelandic but not by different verbs as is in English.

(21) *Hann hefur farið til Íslands.* (experiential perfect)
he has gone to Iceland
'He has been to Iceland' (lit.: 'He (has) gone to Iceland')
(22) *Hann er farinn til Íslands.* (perfect of result)
he is gone to Iceland
'He has gone to Iceland' (lit.: 'He (is) gone to Iceland')

While in English this difference appears to be confined to verbs such as *go* and *be*, other types of verbs naturally permit this distinction in Icelandic. For instance, a change of state verb like *bresta* 'crack' which imparts exactly the same semantic difference to the sentences.

(23) a. *Glasið hefur brostið.*
glass has cracked
'The glass (has) cracked
b. *Glasið er brostið*
glass is cracked
'The glass (is) cracked'

(23)a implies that the event of cracking of the glass happened at some distant time in the past and the glass may perhaps no longer be broken. By contrast, (23)b refers to the present time in which the glass is still broken as a consequence of the event that it has just cracked. Refer back to examples (19) and (20). The only difference between these is that (19) expresses 'experiential perfect', whereas (20) 'perfect of result'[4].

An anonymous reviewer mentioned that sentences which contain *vera* might in some cases turn out to be passives. It is indeed true that the meaning of perfectives resembles that of adjectival passives which describe the resultant state, as shown in

(24)a, which is close to (25)a, a perfective sentence with *vera*, in that both refer to the state of the window as broken. Despite this similarity, (25)a is distinguished from (24)a by the extent to which they permit phrases referring to different degrees of the agentive activity. As can be seen in (24)b and c and (25)b and c, such phrases are only compatible when the sentence contains the past participle of the transitive verb *brjóta* 'break'. Purely formally, perfectives can be stated to be identical to passives due to the agreement patterns; semantically, however, these two should be treated separately.

(24) a. *Glugginn var brotinn.*
window was broke (TRANS)
'The window is broken'
b. *Glugginn var brotinn með hamri.*
window was broke with hammer
'The window was broken with the hammer'
c. *Glugginn var brotinn af Hans.*
window was broken by Hans
'The window was broken by Hans'
(25) a. *Glugginn var brotnaður.*
window was broken (INTRANS)
'The window was broken'
b. **Glugginn var brotnaður með hamri.*
window was broken with hammer
'The window was broken with the hammer'
c. **Glugginn var brotnaður af Hans.*
window was broken by Hans
'The window was broken by Hans'

2.5. TIME EXPRESSIONS. The behaviour of time expressions is sensitive to the selection of *hafa* and *vera*. Icelandic has time expressions such as *í* and *á* which correspond to English prepositions 'for' and 'in', respectively; *í* emphasises the process of an event, while *á* the endpoint. An interesting fact is that while *hafa* is compatible with both *í* and *á*, *vera* does not allow *í*. Consider the contrast in (26) and (27): in the latter the 'perfect of result' interpretation assigned to the *vera*-sentence disallows *í*.

(26) *Grasið hefur sprottið í/á mánuð(i).*
grass has grown for/in month
'The grass (has) grown for/in a month'
(27) *Grasið er sprottið *í/á mánuði.*
grass is grown for/in month
'The grass (is) grown in a month'

2.6. COMPOSITIONALITY. A further important characteristic in Icelandic auxiliary selection is that there are certain sets of verbs which can select *vera* only when they co-occur with some adverbial expressions. Take a verb like *synda* 'swim'; it allows *hafa* without a problem, as in (28)a, but it cannot appear with *vera*, as in (28)b. This verb can allow *vera* only when it co-occurs with adverbials such as *burt* 'away' and *yfir* 'over' which highlight an initial movement and a particular direction of a movement, respectively. Alternatively, *vera* is also compatible when a directional phrase such as *á árbakkann* 'to the riverbank' is supplemented which specifies an endpoint of a movement. Example (28)c illustrates a case in point. Note that, as indicated in (28)a and c, *hafa* is not sensitive to the presence or absence of adverbial expressions—the only difference between *hafa* and *vera* in (28)c is ascribed to the constructional meanings.

(28) a. *Hann hefur synt.*
he has swum
'He (has) swum'
b. **Hann er syntur.*
he is swum
c. *Hann hefur/er synt/syntur burt/yfir/á árbakkann*
he has/is swum away/over/to riverbank.the
'He (has/is) swum away/over/to the riverbank'

3. PREVIOUS ACCOUNTS. There are two accounts worthy of mention with regard to auxiliary selection. One approach considers the agreement as a determinant, whereas the other proposes a single semantic primitive as a determinant. I will show that neither approach can correctly explain the exact behaviour of Icelandic auxiliaries.

3.1. ACCOUNT BASED ON AGREEMENT. Sigurðsson (1993) argues based on agreement factors that the distinction between *hafa* and *vera* can be made by referring to verbal and nominal/adjectival categories of past participles (henceforth PP). He claims that *vera* is chosen because PPs behave just like nouns or adjectives, whereas *hafa* is chosen because PPs behave like verbs. In order to show the adjectival property of PPs, he refers to 'normal' adjectives which agree with subject in number and gender and identifies PPs with adjectives. Consider example (29):

(29) *Hann er mjór.*
he is thin.MASC.SING
'He is thin'

One problem with this analysis is that this kind of analogy cannot account for the mere fact that he is in a state of being thin, but it does not say anything about consequences in relation to the present time brought about by what is expressed by the adjectival sentence. Furthermore, PPs which appear with *vera* cannot always be adjectival. For example, not every PP can appear as an attributive in the adjectival past participle constructions, although adjectives such as *mjór* naturally do so. All these observations lead us to say that past participles do not exactly share a common set of properties with adjectives. (30) presents a case in point[5].

(30) a. *Hann er kominn.*
he is come
'He (is) arrived'
b. **Hann er kominn maður.*
he is come man
'He is an arrived man'
c. *Hann er mjór maður.*
he is thin man
'He is a thin man'

In order to show that uninflected PPs are verbal, Sigurðsson also refers to modal verbs such as *geta* 'can' which can precede an uninflected PP and draws an analogy between modal verbs and an auxiliary *hafa*. Consider examples (31)a and b in which PP is in neuter and singular. The problem with this analysis is of two kinds. One is that *geta* can also have an infinitive when the sentence expresses a perfective meaning, as in (30)c, and the other is that there are other types of modal verbs which do not take PP but always an infinitive, as in (32) (see Pétursson 1987:99–100). As the following examples illustrate, the analogy between *geta* and *hafa* is untenable, indicating that its relation to categorical distinctions, verbal versus adjectival/nominal, cannot be defended successfully.

(31) a. *Hann getur komið.*
he can come.NEUT.SING
'He can come'
b. *Hann hefur komið.*
he has come.NEUT.SING
'He (has) come'
c. *Hann getur hafa komið.*
he can have.INF come.NEUT.SING
'He may have come'
(32) a. *Hann vill koma.*
he wants to come.INF
'He wants to come'
b. *Hann má koma.*
he may come.INF
'He may come'

3.2. SEMANTIC ACCOUNT. Lieber and Baayen (henceforth L&B) propose that auxiliary selection in Dutch is determined semantically. Analysing Dutch data, L&B claim that all verbs which take *zijn* 'be' have a single semantic feature, INFERABLE EVENTUAL POSITION OR STATE, abbreviated as IEPS, which is contained in the meaning of the main verb or realised compositionally in the syntax. This feature refers to the eventual position or state of an entity which goes away from a starting point, comes closer to an endpoint, or undergoes a change of state in the event described by the verb. Due to the name 'inferable' it is denoted that the position or state which might consequently arise is not necessarily to be reached, although it is also possible that the endposition or endstate comes to be realised. In other words, the position or state is always 'implied' and this semantic component is, according to L&B, a sufficient criterion for the determination of auxiliary selection. Hence IEPS is regarded as a semantic primitive which no longer breaks down into finer elements.

One problem with this analysis is that the initial stage of an action and the final stage of it are both subsumed under the same semantic category. For instance, the sentence *John fled the country* expresses John's initial stage of the whole event of fleeing, that is, all that is known is that he is away from his original location without being explicit about where he finally arrives. Along the same lines, the sentence *John arrived at the station* expresses John's eventual position at the station. L&B treat these two conceptually different stages of the event identically and claim that both *flee* and *arrive* contain IEPS. In fact, in Dutch both *vluchten* 'flee' and *arriveren* 'arrive' take BE, and Icelandic verbs *flýja* 'flee, escape' and *koma* 'come, arrive' behave similarly. If a conclusion is drawn based simply on the selection of auxiliaries, the present analysis might be satisfactory. However, this analysis turns out to be problematic when a close look is taken at a certain set of Icelandic verbs which are sensitive to whether the designated events are at an initial stage or at a more advanced stage. For instance, verbs such as *reika* and *flakka* both meaning 'wander' behave differently with respect to adverbial expressions although they are similar in not taking *vera* without complements; *reika* only needs the addition of an adverb *burt* 'away' to be compatible with *vera*, as in (33), whereas *flakka* needs the addition of another adverb describing an end position, as in (34) and (35). This subtle behaviour of the two verbs cannot be accounted for by a single element IEPS.

(33) *Jón er reikaður burt*
John is wandered away
'John (is) wandered away'
(34) **Jón er flakkaður burt.*
(35) *Jón er flakkaður burt til strandar*[6].
John is wandered away to coast
'John (is) wandered away to the coast'

In the following section I propose three components which play a crucial role in the selection of auxiliaries in Icelandic.

4. THREE MEANING COMPONENTS. Although the present analysis shares the basic insight of L&B, their semantic primitive IEPS for the treatment of the availability of BE is not explanatory for Icelandic data. I will now show that the availability of *vera* is sensitive to at least three stages of the event encoded by the main verb, and they are exemplified clearly by the verb's compatibility or incompatibility with adverbial expressions. I call these components 'recessional motion', 'directed motion', and 'achieved endpoint'. As discussed in 3.2, IEPS encompasses a wide range of event types; consequently, it brings about some ambiguity in the elaboration of events, particularly when the behaviour of verbs with respect to their compatibility with different types of adverbial expressions is looked at closely. If the components I now present should fall into a single element IEPS, the different behaviour of auxiliaries in combination with different adverbials would not be explained correctly.

4.1. RECESSIONAL MOTION. As I have mentioned in (2.2), there are sets of verbs which permit *vera* when they appear with adverbials which express a recessional movement. Consider a verb like *fljóta* 'float' which can take *vera* only when an adverbial like *burt* 'away' is supplemented. The sentence (36)b does not say anything about the endpoint of the leaves. What is at issue is that leaves go away from the starting point or their original location. The recessional element can more clearly be shown by the compatibility with the adverbial phrase which expresses a source *frá árbakkanum* 'from the riverbank'.

(36) a. **Laufin eru flotin.*
leaves are floated
b. *Laufin eru flotin burt/frá árbakkanum.*
leaves are floated away/from riverbank.the
'Leaves (are) floated away/from the riverbank'

Verbs which behave similarly to *fljóta* 'float' are, for example, *aka* 'drive', *buna* 'gush', *haltra* 'limp', *reika* 'wander', *skríða* 'crawl', *stökkva* 'jump', *synda* 'swim', etc.

4.2. DIRECTED MOTION. The second meaning component is 'directed motion' which expresses a situation in which an entity is directed to a definite goal, but, importantly, it does not necessarily arrive at that goal. Just like *fljóta*, as we saw in (36) above, the verb *flakka* 'wander' does not allow *vera* on its own but it does so when it co-occurs with a directional phrase such as *til stöðvarinnar* 'to the station'. It appears that verbs with directed motion do not contain a recessional element, which is shown by the incompatibility with *frá þorpinu* 'from the village' and *burt* 'away' in (37)b.

(37) a. **Jón er flakkaður.*
John is wandered

(37) b. *Jón er flakkaður til stöðvarinnar/*frá þorpinu/*burt*
John is wandered to station.the/from village.the/away
'John is wandered to the station/from the village/away'

Verbs which behave similarly to *flakka* are *blossa* 'blaze', *ná* 'arrive at, go', *rata* 'find the way', etc.

In order to justify the existence of the distinction between 'recessional motion' and 'directed motion', it is important to refer us to a verb like *flytja* 'move' which can mean both 'emigrate' and 'immigrate' depending on the adverbials which it is combined with. When the verb is combined with *út* 'out', it means 'emigrate', as in (38). However, it needs to be combined with a directional expression like *til Íslands* 'to Iceland' when it means 'immigrate'. This indicates that the activity of emigrating does not particularly concern where exactly the person who emigrates goes but it is important that he/she goes away from his/her original location. By contrast, a more exact information about where he/she arrives at is required when someone immigrates, that is, the goal must be expressed. This contrast corresponds neatly to our concepts of 'recessional motion' and 'directed motion', providing reasonable evidence that Icelandic is sensitive to this distinction.

(38) *Jón flytur út.*
John move out
'John is emigrating'
(39) a. **Jón flytur til.*
John move to
b. *Jón flytur til Íslands.*
John move to Iceland
'John is immigrating to Iceland'

4.3. ACHIEVED ENDPOINT. In Icelandic there are certain sets of verbs which can take *vera* only when they appear with adverbial expressions which describe the endpoint or the achievement of an action. Verbs which typically belong to this semantic class are *blunda* 'nap, doze', *byrja* 'begin, start', *híma* 'idle', *hörfa* 'retreat', *liggja* 'lie', *snjóa* 'snow', *sofa* 'sleep'. We may perceive a situation in which snow falls from the sky to the ground. However, this directional element does not facilitate the use of *vera*, as given in (40)b. By contrast, (40)c accepts *vera* when the sentence contains *vel* 'well, completely' which refers either to a heavy snowfall which has already occurred or to a snowy scenery distributed evenly which is brought about by the snowfall. Note that in either interpretation (40)c implies that it finished snowing. Some verbs like *enda* 'end, finish', as shown in (41), require another type of adverbial such as *loks* 'finally' which also indicates the completion of the event or certain extent of it.

(40) a. **Það er snjóað.*
it is snowed

(40) b. *?Það er snjóað niður.*
it is snowed down
c. *Það er vel snjóað.*
it is well snowed
'It (is) snowed well'
(41) a. **Hátíðin er enduð.*
ceremony.the is ended
b. *Hátíðin er loks enduð.*
ceremony.the is finally ended
'The ceremony (is) finally ended'

The difference between 'directed motion' and 'achieved endpoint' might be found in the behaviour of time prepositions such as *á* 'in' and *eftir* 'after'; the former is often used to stress the process which leads to the endpoint, whereas in the latter the final point backgrounds the process leading to it. A relevant fact for the sake of our discussion is that verbs with an achieved endpoint take *eftir*, but not *á*, when the time expression is added, indicating that the designated event has come to the final point. In (42) after an hour there is a snowy landscape and it possibly does not snow any longer. Likewise, in (43) after an hour the ceremony comes to the end and nothing goes on further.

(42) *Það er loks vel snjóað eftir/*á klukkutíma.*
it is finally well snowed after/in hour
'It (is) finally snowed well after an hour'
(43) *Hátíðin er loks enduð eftir/*á klukkutíma.*
ceremony.the is finally ended after/*in hour
'The ceremony (is) finally ended after an hour'

Verbs with directed motion do not allow the time expression with *eftir*, since these verbs still concern the process which leads to the possible implied endpoint. Consider again the verb *flakka* 'wander' which behaves differently from verbs with an achieved endpoint. As shown in (44)b, *flakka* can allow *eftir* only when it co-occurs with the adverb *loks* 'finally' which brings the expression of a completion of the action to the fore. Needless to say, the behaviour of the verb *flakka* clearly shows that *vera* is chosen whenever the directional element is introduced to the sentence, but the contrast shown in (44) makes it clear that there is still a semantic difference between 'direction' and 'achievement'.

(44) a. *Jón er flakkaður til stöðvarinnar á/*eftir klukkutíma.*
John is wandered to station.the in/after hour
'John (is) wandered to the station in an hour'

(44) b. Jón er loks flakkaður til stöðvarinnar á/eftir klukkutíma.
John is finally wandered to station.the in/after hour
'John (is) finally wandered to the station in/after an hour'

5. CONCLUSION. In the preceding sections I have drawn attention to the relevance of semantics which underlies the selection of auxiliaries in Icelandic. Verbs' various combinations with adverbial expressions have been shown to be clues to the existence of three meaning components extracted. It has also been shown that the argument based on the agreement is still weak and a semantic account, as we have proceeded with, seems to provide more explanatory possibilities than the proposal relying on lexical categories such as 'verbal' or 'adjectival' to explain the selection of *hafa* and *vera*.

One important question which remains to be explored is if semantic components extracted in a given language can be regarded as universal categories. At least in this study it has become clear that INFERABLE EVENTUAL POSITION OR STATE cannot be extended to Icelandic, *contra* L&B's presumption. However, in L&B's study the possibilities of verbs' combinations with adverbial expressions are not dealt with in any depth. This might imply that a more elaborate result is still to be expected cross-linguistically, which will enable us to come closer to any clarification.

I trust that this study has paved the way for a more detailed exploration of auxiliary selection and has also demonstrated that the notion of unaccusativity should not be universally held. Finally, the relevance of semantics in auxiliary selection in Icelandic will certainly shed light on topics in the interface between syntax and semantics in natural language.

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[2] Corresponding English auxiliaries are put in parenthesis in glosses throughout the paper so as to alert the reader which auxiliary is used. When (have/has) appears, the sentence conveys the meaning that 'someone has an experience of having done something' or 'something occurred in the past'. When (are/is) appears, the sentence conveys the meaning that 'someone has done something or something occurred in the recent past, and its consequence is perceived by the speaker'. When the free English translation reflects the exact meaning of Icelandic auxiliary sentences, I left that translation and the literal translation is placed after it, as in (21) and (22).

[3] The unaccusative status of verbs like *appear* in English is substantiated by their ability to figure in *there*-construction, as shown in (2). However, this construction in Icelandic permits all types of verbs including transitives to appear, indicating that it does not serve to provide the unaccusative/unergative split. Consider the examples below.

(i) *Það birtist skip við sjóndeildarhringinn.*
there appeared ship on horizon.the
'There appeared a ship on the horizon'

(ii) *Það sungu tvær konur á sviðinu.*
there sang two women on stage.the
'There two women sang on the stage'

(iii) *Það sungu tvær konur fagran söng.*
there sang two women beautiful song
'There two women sang a beautiful song'

[4] It is worthy of mention that in some cases, particularly with verbs of existence, a dual semantic distinction is made by *hafa* only. I surmise that the reason *vera* is not called into use is that its counterpart *hafa* alone can express the perfection of an event. Consider an example below:

(iv) *Jón hefur verið kyrr í herberginu.*
John has been quiet in room.the
'John (has) remained in the room'

This single sentence holds two readings:

(v) We do not know whether he still remains in the room.
(vi) We know that John still remains in the room.

[5] In point of fact, the majority of past participles can appear in the adjectival past participal construction, though there are still certain verbs which take *vera* as an auxiliary but do not permit this construction at all; for example, *aka* 'drive', *fljóta* 'float', *klifra* 'climb', *lenda* 'land', *ná* 'reach', *rata* 'find the way'.

[6] Sentences (33) and (35) can also have the following stylistic variants without changing the sentential meaning; there is no influence on the selection of auxiliaries. In this paper I use standard forms that sound most natural to native speakers of Icelandic.

(33)' *Jón er burt reikaður.* (attested)
(35)' *Jón er burt til strandar flakkaður.* (attested)
Jón er til strandar flakkaður burt. (attested)

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FIRST NAMES AS MEANINGFUL UNITS: SUPPORT FOR A USAGE-BASED VIEW OF LANGUAGE

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The semantics of proper nouns has had little consideration in linguistics. Those accounts that do exist tend to conclude that the meaning of a proper noun is its unique referent—in the case of first names, the person bearing the name. This idea is expressed, for example, by Geoffrey Leech: '*Daphne* is best defined semantically as simply "the one named *Daphne*", and similarly for other proper names' (1990:160). This paper presents a way in which first name meaning can be explored beyond looking at the properties of particular individuals. In a study conducted on the semantic attributes associated with first names in American English, I found that these often have a relatively high degree of conventionality. At least some names can therefore be said to have gestalt conceptualizations, or meanings. Usage-based frameworks predict the existence of such conceptualizations for first names and make further predictions about their type, conventionality and origin. Given the way and degree to which these predictions are borne out by the data from the first name study, we can say that usage-based frameworks account for name meaning in a unified way. Other (semantic) theories, such as those based on feature components or truth conditions, make no such predictions and cannot account for observed patterns without relying on special mechanisms or 'processing'.

For the purposes of this paper, a 'usage-based theory' is one which includes, but is of course not limited to, the following general principles:

a. (Linguistic) meaning is conceptual structure, not a property of a 'real world' referent
b. Meaning is usage driven and affected by factors such as frequency of occurrence.[1]

Based on principle a, usage-based models predict that first names, and in fact all linguistic units, have some kind of meaning since all words have concepts associated with them. Principle b predicts that the nature of those concepts for any given word is based largely on our experience with that word. When an association between a concept and a linguistic unit is formed through experience (often through repeated experience), the concept becomes part of the word's meaning. Almost all words have both shared and individual concepts that contribute to their meanings. Assuming the validity of these principles, it follows that the degree to which linguistic meaning is shared in a language community (i.e., conventionality) is based on the degree to which that community's linguistic experience is shared. This paper deals primarily with the influence of experience on first name meaning. I contend that our exposure to first names is not entirely random, and that this results in a somewhat conventional semantics of first names.

Specifically, two factors relevant to experience are explored: age statistics based on naming trends and the influence of the media. I do not assume that these are necessarily the most influential factors—they were chosen over others primarily because they are two of the most testable and measurable elements of experience. Certainly other factors will be relevant—sound symbolism for example (cf. Cutler et al. 1990)—but due to space restrictions I do not explore these here.

I conducted an Internet survey, the goal of which was to determine whether there is any conventionality to characteristics attributed to certain names. Respondents were solicited from various electronic notice boards and discussion lists, with an aim to keeping the subjects as diverse as possible in terms of age, sex, geographical location (within the U.S.) and background. 185 usable data sets were collected. These were from 39 different states, from people ranging in age from 14 to 79, and from both men and women[2]. All respondents had in common computer access and, often, membership in a discussion list or notice board (thus likely a higher than average level of education and income). Furthermore, all volunteered to respond to my survey.

The survey itself had three different versions, differing only in the actual names that were tested. Each respondent filled out one version, thus, for each set of names there were about 60 responses. Each version had two parts. In the first, respondents were asked to imagine a person with the particular name provided and then to answer certain questions, as given below for the name *Alexander*.

1. What is Alexander's age?
2. What is Alexander's hair color (choose one): blonde, brown, black, red, gray, no opinion?
3. Is Alexander (choose one): highly intelligent, of average intelligence, of low intelligence, no opinion?
4. Is Alexander (choose one): very successful, successful, unsuccessful, no opinion?
5. Do you personally know anyone named Alexander?
6. Do you know of any famous Alexanders, fictional or real?
7. If yes, who?

In Part Two, respondents were asked to provide up to five characteristics of an imagined person with a particular name (which corresponded to selected names from Part One of one of the two other versions of the survey). This was done for three different names per version (9 names total) and was completely open-ended.

The survey was designed to allow a comparison of responses with some fairly objective element of experience. One way in which people's experience with

Grp. 1—1930	Avg. Age	Grp. 2—1960	Avg. Age	Grp. 3—1990	Avg. Age
Anna	36.9	Brenda	34.6	Aaron	24.1
Arthur	44.3	Cindy	26.1	Alexander	27.9
Harold	49.8	Deborah	36.8	Amanda	19.2
Helen	51.2	Douglas	40.6	Ashley	17.5
Jack	41.3	George	50.9	Cody	13.2
Jean	46.5	Gregory	37.6	Emily	25.6
Lois	49	Keith	30.6	Joshua	19.1
Louis	47	Randy	33.4	Lauren	30.3
Ralph	49.3	Sharon	37.2	Sarah	27
Ruth	54.9	Teresa	36.2	Tyler	14.4
Average age	**47**		**36.4**		**21.8**

Table 1. Average ages attributed to studied names.

particular names can be gauged is to look at statistics relating to name popularity at a given time. Certain first names can be shown to have had a peak of popularity as baby names, then to have faded in prominence. From this it follows that most people with one of these first names will fall into a certain age range based on the years when the name was popular. If the ages people associate with those names roughly correspond to the appropriate age range, we can deduce that respondents have been influenced by their experience with (people with) those names.

The names tested were chosen based on their trends in popularity as baby names. Ten names, which make up GROUP ONE, were in the top 40 for boys and girls[3] in 1930 but not in 1950[4]. These are *Anna*, *Arthur*, *Harold*, *Helen*, *Jack*, *Jean*, *Lois*, *Louis*, *Ralph* and *Ruth*[5]. Ten more, GROUP TWO, were in the top 40 in 1960, but not in 1940 or 1980 (i.e., twenty years before and after). They are *Brenda*, *Cindy*, *Deborah*, *Douglas*, *George*, *Gregory*, *Keith*, *Randy*, *Sharon*, and *Teresa*. The next ten, GROUP THREE, were in the top 40 in 1990 but not in 1970. They are *Aaron*, *Alexander*, *Amanda*, *Ashley*, *Cody*, *Emily*, *Joshua*, *Lauren*, *Sarah* and *Tyler*. It is thus reasonable to expect that people with GROUP ONE names are more likely to be 60+ years old than to be 20 or 40[6]. Similarly, people with names from GROUP TWO (with a peak of popularity in 1960) are most likely to be 30–50, and people with names from GROUP THREE, 0–20. Of course there are exceptions, but if respondents consistently indicate in the survey that an imagined Harold is 70 and that Cody is 10, this would be strong evidence in support of experience shaping those associations.

In examining the survey data, we see an apparent relation between the ages associated with first names and the period when the names were popular. Table 1 lists the averages of ages attributed to each name.

Not only are the averages for each group at least ten years apart, but it is also interesting to look at specific cases. In GROUP ONE, for example, all names were attributed ages above 40 except *Anna*. In GROUP TWO, 9 of 10 fit the predicted range of 30–50, although most were closer to 30. The one exception was *Cindy*, and I will address below why Cindy may have younger age associations than the naming trends would suggest. In GROUP THREE, only 5 of 10 names fit the predicted range of 0–20, but all were thirty or younger and the average was only slightly more than 20.

One reason why the 'young' names may have somewhat older age averages than we would predict and that the 'older' names have somewhat younger age averages is precisely that we are considering averages. Thus, although 11 people said that *Harold* was 60 or older and 4 said he was 70 or older, one person said he was only 8, helping to bring the average age for *Harold* down to just under 50. What is important is not that the attributed ages match up precisely with ages predicted based on naming trends, but that these are related.

The results clearly suggest that our experience as speakers of American English is responsible for the attributed age associations. However, this likely comes as no surprise to the reader. It seems intuitive and reasonable that if most people with a certain name are in their twenties, that we will come to associate a young age with that name. But what about hair color, personality, intelligence, and other characteristics that have no non-random equivalent to naming trends? One would expect that the actual intelligence or hair color of someone known to any given respondent should be unpredictable given only their name, and thus there should be no systematicity in the results for hair color, intelligence and success for any particular name. This is only a reasonable assumption, however, if we consider that our experience is made up solely of interactions with people we know personally, ignoring other influences such as cultural narratives (i.e., storytelling) and the media, including television, films, literature, radio, etc.

One of the effects of the media is that they make certain people or characters known to an entire community. So although any two (American) respondents are very unlikely to know the same *Cindy* or *Thomas* personally, they are very likely to both know of Cindy Crawford and Thomas Jefferson. Given a usage-based framework where experience shapes meaning, we can predict that due to the influence of various media, the characteristics of famous people or culturally salient characters with a particular first name may come to be included among the attributes associated with that name. And since there are usually only a small number of famous people associated with any given name (as per question 7 in the survey), we expect some conventionality in the results.

This prediction is in fact supported by the survey data. One of the clearest examples is that of *Cindy*, being one of the nine names in Part Two of the survey which was open-ended. Of the names in Part Two, *Cindy* had the most consistent and frequently mentioned famous people associated with it, namely Cindy Crawford and, to a lesser extent, Cindy Brady. Cindy Brady is a character from the 70's TV show *The Brady Bunch*. She is a cute and energetic young girl with blonde hair and ponytails. Cindy Crawford is a supermodel—she is attractive, tall and thin, and has light brown hair. She is 34 years old, outgoing and energetic and has been extremely successful.

ATTRACTIVENESS	BUILD/WEIGHT	EXTROVERSION	HEIGHT
attractive (x2)	average	bouncy	short (x4)
cute (x8)	good figure	bubbly (x3)	tall (x2)
gorgeous	overweight (x2)	ebullient	
pretty (x6)	petite (x2)	outgoing (x4)	
professionally cute	slender	peppy	
	thin (x3)	perky (x4)	
	tiny	quiet	
		sociable	
		vivacious	
18/18 attractive	8/11 thin	16/17 extroverted	4/6 short
0/18 unattractive/ average	2/11 overweight	1/17 shy/quiet	2/6 tall
	1/11 average		

Table 2. A selection of the actual attributes mentioned by respondents for the name *Cindy*.[7]

Interestingly, the responses with regard to Cindy were very consistent in some respects as shown in Table Two below. These include extroversion (16/17[8], p=0.001) and attractiveness/cuteness (18/18, p<0.001). These are attributes that apply to both Cindy Crawford and Cindy Brady; in fact both are very salient characteristics of these two *Cindys*. With regard to hair color, responses were somewhat less conventional, with 17/22 saying Cindy is blonde and 5/22 dark-haired (and no red or gray hair mentions). The hair colors attributed to the name Cindy are those of the two most (mentioned) famous Cindys.

Furthermore, age attributes for Cindy, based on data in Part One, averaged 26—approximately the average of the ages of Cindy Crawford and Cindy Brady. It may be that an association with Cindy Brady resulted in a lower than predicted age association for Cindy as mentioned above. (It is interesting to note that Cindy Brady would today be in her late thirties, meaning that the character's age conforms to the expected range based on name popularity, as does Cindy Crawford's).

There were in fact many names that suggested a link between characteristics of famous people and those attributed to names in the survey. Consider a second example—that of *Ralph*. Famous Ralphs mentioned most often in survey question 7 were Ralph Nader, Ralph Waldo Emerson and Ralph Cramden. Of these, the first two are writers and people are unlikely to know much about their personality or appearance. Ralph Cramden, however, is a TV character from *The Honeymooners*. He is working class, 42 and overweight, and he makes people laugh. Characteristics that were conventionally mentioned for the name *Ralph* were 'overweight' (12/16, p<0.05), 'hard working' (7/9, p=0.07), middle aged to old (14/18, p<0.05) (average age from Part One is 49.3), and sense of humor (4 mentions). Of course attributes were sometimes mentioned for *Ralph* that don't fit the Ralph Cramden image, such as 'geeky' and having red hair, but this is not in the least bit problematic. First, we can identify other *Ralphs* that have some of these other characteristics, such as Ralph Malph from TV's *Happy Days*, who was a nerdy redhead. Second, our experience is, of course, not made up only of television experience. People we know, for example, affect our conceptualizations of certain names, as will other cultural influences. Third, we expect the attributes associated with these names not to reflect any person or character exactly, but to be extracted from a variety of sources, not all of which are necessarily identifiable. Thus, it is not problematic to my claim (that experience shapes conceptualizations of first names) that characteristics occur, even conventionally, which are not representative of a famous figure.

Nevertheless, the resemblance of characteristics in the survey to those of famous people is likely not co-incidental. Usage-based linguistic theories predict that the media, like all sources of experience, play a role in forming our conceptual poles for certain names. Furthermore, it follows that there is a certain amount of conventionality given the widespread influence of the media (the entrenchment of similar experiences in thousands if not millions of people).

The role of popular culture in forming conceptual associations with names should not be overstated. Likely more important is our everyday use of language, which reflects and passes on cultural information. Such language use is, however, very hard to trace. The gestalt concept of a hardworking and overweight *Ralph* may have come about through cultural discourse long before Ralph Cramden, who may simply have been a reflection of our pre-existing conceptual associations with the name *Ralph*. Which came first is a chicken and egg question whose answer is not particularly important. The attributes associated with names are both reflected in and reinforced by media personalities and by other culturally salient characters.

I obviously do not claim to account entirely for all the attributes associated with first names—it is doubtful that this is even possible. I do claim, and hope to have shown, that first names are not semantically different in kind from common nouns, as many semanticists have argued, but rather in degree. As with all linguistic units we acquire meanings for first names based on the contexts in which they are used—in other words, on our experience. It is because the referents of a first name are more varied than referents of common nouns tend to be that the latter have more conventional meanings. In addition, there is little communicative advantage to having a very conventional semantics for first names. In fact, this would clearly be a disadvantage. The conventional images we have of names can perhaps best be considered stereotypes, similar to stereotypes of ethnic groups or of women drivers. Just because there is no basis in fact for assuming that someone named *Anna* is actually shy or that a *Cindy* will be outgoing does not diminish the conclusion that these attributes are part of the associations many of us have with those names. And, often, we can trace the possible origins of some of these conventional associations if we examine some of the types of experience we share.

[1] These principles are applied in, for example, Ronald Langacker's Cognitive Grammar, Joan Bybee's Cognitive Functional Phonology and Sydney Lamb's Relational Network model.

[2] The number of female respondents was about twice the number of male respondents.

[3] By 'top 40' I mean the top 40 boys names and top 40 girls names—approximately the top 80 names overall.

[4] I could find no detailed statistics for years before 1930.

[5] The alliterative nature of male/female name pairs is a coincidence resulting from the methodology used to choose names. Every second name was chosen from the alphabetically organized top 40 lists for boys and girls. Of those that fit the survey criteria, every second was included in the survey. As a result, some male and female names used in the survey are 'alphabetically' similar.

[6] While it is possible that a name that was popular in 1930 but not in 1950 was popular again in 1970 or 1990, this did not appear to be the case with the particular names used in the survey.

[7] Since this part of the survey was open-ended, we can infer from the lack of height-related attributes that height is not as salient an attribute for the name Cindy as, for example, attractiveness.

[8] This fraction indicates that of the 17 people who mentioned Cindy's extroversion/introversion, 16 said she was outgoing whereas only one person said she was shy or reserved.

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DREAM OF THE ROOD: AN INTERNAL ANALYSIS

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Dream of the Rood (afterwards DR), an Old English poem found in the Vercelli manuscript (ca. 950–1000 a.d.), differs from other Old English poems in that it has a distinct break in style beginning at line 78. Previous studies mention the presence of the break, but do not define the differences between the two halves. Dickins and Ross (1956 and 1963) consider the poem to be a composite, consisting of fragments from two earlier poems, both of which were expanded in the Vercelli DR. They compare passages in the A portion (afterwards A) of the Vercelli DR (lines 1-77) to similar passages carved on the Ruthwell Cross (ca. 650-750 a.d.), suggesting that the Ruthwell Cross and DR were each derived from the same, earlier poem. Because no passages from the B half (afterwards B) of the Vercelli DR (lines 78-156) are inscribed on the Ruthwell Cross, they consider this an indication that B is derived from a separate, later, unknown source. They further suggest that the original poem for B was augmented prior to or even at the time of the Vercelli manuscript compilation by selections from other, unknown Old English poems (cf. the passage [lines 140-156] that is similar to a passage found in the *Harrowing of Hell*).

S. Cook (1904) discusses the poem in relation to the four signed Cynewulf poems in particular, as well as to other Old English poems. Cassidy and Ringler (1971) in their introduction to DR list the possible literary sources for the poem (the passion gospels and apocalypses of the New Testament, doctrinal and devotional literature, and Matthew 27 for the cruxificion) but with no detail.

Bruce Mitchell in his *Old English Syntax* (1985) discusses various syntactic structures found in DR and compares them to those found in other OE poems. His comments on paratactic and hypotactic constructions in Old English poetry, and specifically DR, are insightful and thought-provoking. He states that the use or disuse of parataxis and hypotaxis does not determine authorship—most Old English poems include both constructions and often in the same passage.

All these studies provide extensive comparative notes and discussion regarding both linguistic and poetic structures of DR to outside writings. However, they do not provide a comparative analysis of the two halves. Most literary studies consider that the style of B is of lesser quality than is the style of A. No details are given to support this evaluation other than the suggestion of disparate poetic abilities. There is a need for a detailed linguistic analysis and internal comparison of the poetic and linguistic features of the poem in order to discover the variables that define the stylistic differences that would support the perception of a stylistic break between the two halves. This paper provides such a study.

The pertinent variables, that together delineate the stylistic differences separating the A and B halves of DR from each other, were found in the lexical, syntactic, and semantic units, and poetic features. Table 1 is a summary table that details the percentage analysis of each variable. The actual occurrence numbers are included in the text.

LEXICAL VARIABLES. Although a common vocabulary occurs in A and B, each half includes forms not found in the other half. These latter forms are of two types: Type I—individual forms, each a different attribute of the basic form—and Type II—the same form that carries multiple and different meanings according to context, function, and position. *Crist* 'Christ', *man* 'man', *werg* 'criminal' (a subset of man), *rod* 'rood or cross', and the relative pronouns all belong to the Type I category. Each has multiple variants that carry essentially the same meaning as the base word. Each one presents a different facet to the main meaning.

Of the variant forms used to indicate 'Christ', five occur in common: *dryhten* 'Lord', *God* 'God', *Cyning* 'King', *wealdend* 'Ruler', and *Crist* 'Christ'. These words maintain the same connotations throughout the poem. Nine different words meaning 'Christ' occur in A, each featuring a different aspect of Christ, but collectively painting a multifaceted picture: *frea* 'Lord', *hælend* 'Savior', *hæleþ* 'Hero', *beorn* 'Man, Hero, Berne', *hlaford* 'Lord, Loaf-Provider', *guma* 'Man', *æðling* 'Prince', *limwerig* 'the limb-weary One', and *þeoden* 'Prince, Lord'. Five different forms are restricted to B: *bearn* 'Bairn, Son', *ealdor* 'Prince', *weard* 'Guardian', *sunu* 'Son', and *anwealda* 'the only-Ruler'. Each presents an ordinary aspect of Christ.

Three forms for *man* are used in common: *man* 'people, man', *freond* 'friend, supporter', and *reordberend* 'speech bearer'. Seven others occur only in A: *earme* 'the wretched ones', *secg* 'man, retainer', *feond* 'wicked man, fiend', *fuse* 'the hastening ones' (Joseph of Arimathea and Nicodemus), *hilderinc* 'warrior', *beornas* 'men', *þegnas* 'thanes, men, disciples'. Three variants occur that are restricted to B: *leode* 'people', *folc* 'people', and *hæleð* 'man, hero'. Again, the connotations of the words used in A are more descriptive than those in B. None of the Old English words for 'criminal', a subset of *man*, is used in common. Only two forms occur in A: *fracod* 'vile ones' (an adjectival substantive) and *werg* 'criminal'. Only one word for 'criminal' occurs in B: *bealuware* 'wicked men' (a compound word).

Of the variants of *rod* meaning 'cross', those used in common carry two connotations that in many instances simultaneously apply: *beam* 'tree/beam', *beacen* 'sign', *sigebeam* 'victory tree' also carry the connotation of 'cross' or 'Christ' as well as the primary meaning. *Rod* means cross, gallows, or Christ's cross. Context alone determines whether it indicates gallows used for the execution of criminals or the cross Christ died upon, or is used as a symbol for Christ. Three are restricted to A: *treow* 'tree', *wudu* 'woods, tree', and *gealga* 'gallows'. Only one form occurs in B, and that only once: *gealgtreow* 'gallows tree', a compounding of two individual words, each of which occurs separately in A.

Variables	A#	A%	B#	B%	Total
1. Lexical					
Crist	9	64	5	36	14
man	7	70	3	30	10
werg 'criminal'	2	67	1	33	3
rod	3	75	1	25	4
Combined total	**21**	**68**	**10**	**32**	**31**
2. Adverb of time					
ðær 'then'	3	100	—	—	3
ða 'then'	10	77	3	23	13
þonne 'then'	—	—	3	100	3
Combined total	**13**	**68**	**6**	**32**	**19**
3. Adverb of location					
ðær 'there'	15	79	4	21	19
4. Syntactic					
a. Appositives					
Vocative	—	—	2	100	2
Nominal	4	36	7	64	11
Adjectival	3	100	—	—	3
Verbal (reduced relative)	9	100	—	—	9
Half-line clause	5	83	1	17	6
Combined total	**21**	**68**	**10**	**32**	**31**
b. Substantives					
Adjectival	4	57	3	43	7
Numeric	1	100	—	—	1
Dem. *þæt*	6	100	—	—	6
Dem. *ðam,ðan, se*	—	—	3	100	3
Combined total	**11**	**65**	**6**	**35**	**17**
c. Subordinators					
ðær 'where'	—	—	6	100	6
hwær 'where'	—	—	1	100	1
ða 'when'	2	50	2	50	4
hwænne 'when'	—	—	1	100	1
þonne 'than'	—	—	1	100	1
rel. pronouns	—	—	11	100	11
syðþan 'since' et.al.	11	69	5	31	16
þæt 'that'	4	40	6	60	10
Combined total	**17**	**34**	**33**	**66**	**50**
5. Line length					
Hypermetric	32	97	1	3	33
Regular	46	37	77	63	123
Combined total	**78**	**50**	**78**	**50**	**156**
6. Linkage					
Asyndetic parataxis	70	78	20	22	90
Syndetic parataxis	6	30	14	70	20
Hypotaxis (subordination)	12	27	32	73	44
Combined total	**88**	**57**	**66**	**43**	**154**
7. Relative clause	—	—	**11**	**100**	**11**
Reduced relative clause	10	100	—	—	10
Combined total	**10**	**48**	**11**	**52**	**21**
8. Half-line clauses					
Hypermetric subordinate	5	100	—	—	5
Regular subordinate	—	—	13	100	13
Regular complete	17	46	20	54	37
Hypermetric complete	33	97	1	3	34
Combined total	**55**	**62**	**34**	**38**	**89**
9. Clause word order sets					
Alternating OV/VO	4	100	—	—	4
Verb-initial	9	90	1	10	10
Verb-initial Clause (all)	36	73	13	27	49
Adverb-initial	12	71	5	29	17
Combined total	**61**	**76**	**19**	**23**	**87**
10. Clause-initial adverb *hwæðre*	**6**	**86**	**1**	**14**	**7**
11. Clause word order sets					
Dislocation	18	58	13	14	31
Disjunction	21	72	8	28	29
Both dislocation & disjunction	5	71	2	29	7
Combined total	**44**	**66**	**23**	**33**	**67**

Table 1. Percentage difference of significant variables.

Relative pronouns make up the last of Type I words. They are formed by the selection of the appropriate form from the demonstrative pronoun paradigms *se*, *ðæt*, and *seo*.

This form is then combined with the indeclinable particle *þe*. The form each takes is determined by the gender, number, case, and word class of the antecedent noun, e.g., *seðe* ('he who', nominative singular masculine form of the demonstrative se plus the indeclinable particle *þe/ðe*). *Se* and *þe* are also used separately as relative pronouns. Relative pronouns occur only in B. Complete relative clauses do not occur in A; only reduced relative clauses do. The multiple occurrences of reduced relative clauses in A reinforces the perception of a stylistic difference between A and B.

Type II variations consist of those function words which carry multiple meanings. Each meaning is brought out according to context and function. Although a single form with a specific meaning can be statistically insignificant (too few occurrences), when combined with other related but also statistically insignificant forms, the combined total number of occurrences becomes statistically significant.

The first Type II is *ðær/þær*. It has three separate meanings according to position, function, and context: the first meaning is 'then', an adverb of time/sequence, which occurs only in A three times[1]:

(1) …*þæt ic wæs aheawen holtes on ende,*
astyred of stefne minum; genaman me ðær *strange feondas,*
geworhton him þær *to wafersyne, heton me heora wergas hebban,*
bæron me ðær *beornas on eaxlum, oðþæt hie me on beorg asetton,*
gefæstnodon me ðær feondas genoge. 29–33
[…that I was hewn on the wood's edge,
deprived of my voice; strong fiends took me *then*,
wrought for/to themselves then a spectacle, commanded me raise up their criminals,
men bore me *then* on shoulders, until they placed me on a mountain,
enough vile men fastened me *there* (a locative).]

The second meaning is 'there', a locative adverb. It is common to both A and B, but predominantly found in A (15 occurrences, but only 4 in B):

(2) *Aledon hie* ðær *limwerigne…* 63
they laid *there* the limbweary one…

The last meaning is 'where', a subordinate conjunction occuring only in B (6 times):

(3) þær *ic ana wæs mæte wereda* 124
where I was alone in a small group (idiom for 'alone')

Hwær meaning 'where' is also a subordinate conjunction found once and only in B:

(4) hwær *se man sie.* 112
where the man is.

The second Type II form is *þonne*. It functions either as a subordinate conjunction or as an adverb, each with a different meaning according to function. Both occur only in B. The first meaning, 'than', the subordinate conjunction, is used only in comparatives (once):

(5) *þæt ic þone sigebeam secan mote*
ana oftor þonne *ealle men* 127
[that I may seek the victory tree/cross
alone oftener *than* all men]

þonne, meaning 'then', is an adverb of time, occuring only in B (3 time):

(6) *ne þearf ðær* þonne *ænig anforht wesan* 117
any there do not need *then* to be afraid

The third Type II form is *þa/ða*, with two functions and a different meaning for each, according to context. *þa/ða*, 'then' is an adverb that indicates sequential time. It occurs twice in each half:

(7) *He* ða *on heofenas astag.* 103
He *then* ascended into the heavens.

þa/ða 'when' is a subordinate conjunction that indicates time. This subordinator is used three times in A and twice in B:

(8) þa *ic bifian geseah eorðan sceatas.* 36
when I saw the earth's surface tremble/shake.

The fourth Type II form *hwænne* 'when' is also a subordinator, indicating time. It occurs once and only in B:

(9) hwænne *me Dryhtnes rod… gefetige…* 136
when Christ's cross shall fetch me…

SYNTACTIC VARIABLES. The use of certain syntactic units also contributes to the grammatical and stylistic differences between A and B. These syntactic units consist of appositives, substantives, complete relative and reduced relative clauses, line length, dislocation and disjunction of word order, word order patterning, parataxis, and hypotaxis.

Appositives are elaborations not required by the story line but inserted in order to fulfill alliterative or other poetic requirements. In DR, appositive constructions takes five forms: vocative, nominal, adjectival, verbal, and clausal. Each fulfills a different function. If an appositive set alone is not of a sufficient number of occurrences to be significant, the combined total can be definitive in distinguishing between the styles of A and B.

The function of the vocative is to attract the hearer's attention as well as to meet poetic requirements. It should be noted that an appositive can have an appositive of its own as in (10) below. There *hæleð min* is the vocative to the subject *þu*, while *se leofa*, an appositive adjectival substantive, explicates the vocative appositive:

(10) *Nu ðu miht gehyran* hæleð min se leofa 78, 95
Now you might hear *my hero, the dear (one)*

The nominal appositive is a descriptive phrase that can further delineate the referent noun, (11) below, or can be just another way of saying the same thing, (12), (13) below—no new information or very little is added. Four occur in A and seven in B.

(11) *scire sciman* 54
'bright radiance', modifying *Wealadendes hræw* 'the Lord's corpse'
(12) *Anwealda ælmihtig* 153
the almighty Only-Ruler
(13) ælmihtig God 93, 106, 156
almighty God

Appositive adjective phrases fulfill the same function as the noun phrase appositives do. They occur only in A. All three are in superlative constructions:

(14) *beama beorhtost* 6
the brightest of trees (i.e., Christ's cross)

Verbal appositives are reduced relative clauses that either repeat or elaborate on an antecedent predicate using different words. The verb is either a past participle, a present participle, or an adjectival substantive. There are nine reduced relative clauses in A and none in B. The reverse is true for the full relative clause, all in B but none in A (cf. above discussion on Type I relative pronouns).

(15) *leohte bewunden* 5
wound (around) by light
(16) *ðær licgende lange hwile* 24
lying there a long while
(17) synnum fah 13
stained by sin

An appositive can be an appositive to another appositive as (18) is to (17):

(18) *forwunded mid wommum* 14
grieviously wounded by sin

The clausal appositive is the last type noted in DR. This appositive consists of a four word, $^{1}/_{2}$ line long, independent clause that inserts extraneous comment not required by the story line (19), acts as a nominal modifier (20), or provides a commentary on a particular passage (21). The clausal appositive occurs only in A.

(19) *ic þæt gyta gemon* 28
I remember that yet
(20) *þæt wæs God ælmihtig* 39
that was God almighty
(21) *þæt wæs egeslic wyrd!* 74
that was a dreadful fate!

The second syntactic variable is the substantive—adjectival, numeric, or demonstrative. Although adjectival substantives occur almost equally in A (4) and B (3), those in A provide an entirely different flavor to the style of A than does the pedestrian adjectival selection used in B—contrast (24) and (25) with (26) and (27).

(22) *fuse* 57
the hastening (ones)
(23) *limwerigne* 63
the limb-weary (One) (i.e., Christ)
(24) *fea* 115
the few (people)
(25) *mid þa halgum* 143, 154
with the holy (ones)

When a numeric is used as a substantive, the number itself is used without an accompanying noun. The only occurrence is in A.

(26) *swylce þær fife wæron uppe on the eaxlgespanne* 8
likewise five were there up on the crossbar

The last syntactic variable consists of demonstratives used as nominal substantives. There are six occurrences of the form *þæt*, all restricted to A. Three different demonstrative forms are used as nominal substantives in B: *ðam*, *þan*, and *se*.

(27) *þæt wæs geara iu—ic* þæt *gyta geman* 27
that was long ago—I remember *that* yet

(28) *for* þan *ic þrymfæst nu hlifige under heofenum* 84
for *that* I glorious now tower under heaven
(29) *me is willa to* ðam *mycel on mode* 129
my desire to *that* is great in mind
(30) se *ah domes geweald* 107
that (one) possessed the power of judgment

LINE LENGTH. The next stylistic difference is brought about by line length. Hypermetric lines change style through an increase in the number of words, syllables, and primary stresses within the line. Hypermetric lines are a means of expansion, a way to add more details. They also alter the character of the poem wherever they occur, making it wordier than the terse four-foot line inherited from Early Old English. The contrast between a hypermetric line and a regular one is great. Hypermetric lines can have an extra foot in either half line (31) or in both half lines of a line (32).

(31) *strang ond stiðmod;* *gestah he on gealgan heanne…* 40
strong and resolute; he mounted on the gallows high…
(32) *Bedealf us man on deopan seaþe:* *hwæðre me þær Dryhtnes þegnas* 75
One buried us in a deep pit: nevertheless God's thanes [adorned] me there…

There are 32 hypermetric lines in A, interspersed among the regular four-foot lines, but only one in B (line 133). The hypermetric line in B does not differ in form from those in A:

(33) *gewiton of worulde dreamum,* *sohton him wuldres Cyning.* 133
went from the world's joys, sought for themselves the King of Glory.

A comparison of regular lines hypermetric lines illustrates the stylistic contrast existing between the two line lengths (34). The give and take or tension between hypermetric and regular lines in A helps differentiate A's style from B's.

(34) *Syllic wæs se sigebeam,* *and ic synnum fah,*
forwunded mid wommum, *geseah ic wuldres treow*
wædum geweordod, *wynnum scinan.* 15–16
[Wondrous was the victory tree, and I stained with sin,
grievously wounded with sin, I saw the tree of glory
decorated by weeds (coverings) shine beautifully.]

WORD ORDER DISLOCATION AND /OR DISJUNCTION. The dominant word order patterns of all syntactic units is OV. VO word order occurs only when a reordering is necessary to meet alliteration and/or stress requirements. Three processes occur that reorder the elements of a syntactic unit. Dislocation, the first process, reverses the positions of contiguous elements (*gebiden hæbbe* in (36)). The second process, disjunction, maintains the regular order but inserts extraneous elements from other syntactic units between the syntactic elements (cf. separation of BE and the past participial form by adverbial phrase, in (35)). The third process is that of disjunction and dislocation in the same syntactic unit (also illustrated in (36)). The position of *feala*, the governing head of the genitive *wraðra wyrda*, normally would occur after the genitive noun phrase; however, dislocation reversed the positions of *feala* and *wraðra wyrda*, and disjunction separated the unit elements with the medial insertion of *ic on þam beorge gebiden hæbbe*.

(35) wæs *mid wætan* bestemed 22
was with moisture *made wet*
(36) Feala *ic on þam beorge* gebiden hæbbe wraðra wyrda. 50–51
Many I on the mount *endured have of cruel experiences*.

WORD ORDER SETS. Interplay in clause word order also affects style. The interplay consists of alternating clausal OV and VO word order in successive half lines. Four instances occur in A but none in B.

(37) synnum *fah, forwunded* mid wommum 13–14
with sin stained, sorely wounded *with sin*
(38) …*hwilum hit wæs mid wætan* bestemed, 22–23
beswyled *mid swates gange, hwilum mid since* gegyrwed.
[…at times it was with moisture *suffused*,
drenched with blood's flow, at times with treasure *arrayed*.]

The second is the grouping of successive verb-initial clauses into sets which contrasts with other clause beginnings. Nine sets occur in A and only one in B (Cf. example (1), with *genaman*, *geworhton* and *bæron* in verb-initial positions)

The third clause word order patterning is the clause-initial adverb instead of a clause medial or final position. There are 12 occurrences in A, and five in B. *Hwæðre* 'nevertheless' occurs six times in A and only once in B; all other clause-initial adverbs involve different adverbs with one occurrence each.

(39) Hwæðre *ic þurh þæt gold…* 18
Nevertheless, I through that gold…

LINKAGE. The three sentence and clause linkage patterns differ quite strikingly between A and B. Asyndetic parataxis occurs when periodic sentences follow one another (neither conjunction or subordination occur).

(40) *Rod wæs ic aræred; ahof ic ricne Cyning,*
heofona Hlaford; hyldan me ne dorste. 44–45
[I was raised a cross; I lifted up the great King,
the Lord of the heavens; I dared not bend myself.]

Syndetic parataxis occurs when two or more coordinate sentences are linked through conjunction (*ond* 'and', *ac* 'but', or *oððe* 'or').

(41) Ac *hie þonne forhtiað*, ond *fea þencaþ* 115
But they then are afraid *and* few think

The last linkage pattern, hypotaxis, occurs when linkage occurs via subordination of one clause to another using *syðþan* 'when, after', *oððæt* 'until', *þa* 'when', *swa* 'so', *þær* 'where', *hwænne* 'when', *hwær* 'where', *swylce swa* 'just as', *þæt* 'that', *ærþan* 'before', *þonne* 'than', or any relative pronoun.

(42) þæt *he þonne wile deman,* se *ah domes geweald,*
anra gehwylcum, swa *he him ærur her*
on þyssum lænum life geearnaþ. 107
[that he then will judge, that one who possesses the power of judging,
everyone, as he for himself before here
in this fleeting life earns.]

Asyndetic parataxis (periodic sentences without subordination or conjunction) is far more common in A than in B, 70 occurrences in A, and 20 in B. The reverse pertains regarding syndetic parataxis (coordinate conjunction but no subordination) with six (6) occurrences in A, 14 in B). This is a not surprising result considering B's propensity for clause linkage via conjunction.

Hypotaxic subordination is more prevalent in B also with only 12 occurrences in A but 32 in B. No relative clauses occur in A, but 11 do in B (included in the total occurrences of subordination. The lack of relative clauses, is turn, also affects style and tone, and is a key factor that distinguishes A from B. Both A and B contain lines in which syndetic and asyndetic parataxis and hypotaxis all occur in the same passage.

(43) *þuhte me þæt ic gesawe syllicre treow* 4
on lyft lædan, leohte bewunden,
beama beorhtost. Eall þæt beacen wæs
begoten mid golde; gimmas stodon
fægere æt foldan sceatum; swylce þær fife wæron
uppe on the eaxlgespanne. Beheoldon þær engel Dryhtnes ealle,
fægere þurh fordgesceaft. Ne wæs ðær huru fracodes gealga,
ac hine þær beheoldon halige gastes, 11
men ofer moldon ond eall þeos mære gesceaft. 12

(43) [(It) seemed to me that I saw a more marvelous tree
extend in the air, wound around by light,
the brightest of trees. All that beacon was
begotten with gold; fair gems stood
at the earth's corners; likewise there five were
up on the crossbeam. All beheld there God's angel
fair through eternal decree. Indeed, a criminal's gallow was not there,
but there him beheld holy spirits,
men over the earth, and all this great creation.]

In (43) there is hypotactic subordination indicated by *þæt* (line 4); syndetic parataxis indicated by *ac* (line 11) between clauses and also by *ond* (line 12) between serial nouns; the first and second nouns of this series in lines 11–12 show asyndetic parataxis (*halige gastes*, *men ofer moldon*) as do the clauses in lines 6, 7, and 8 (*eall þæt beacen…*; *gimmas stodon…*; *swylce þær…*) and the appositives in lines 3–4 (*leohte bewunden*, *beama beorhtost*). In (44) there are three instances of clausal hypotaxis (subordination): *hwær*, *seðe*, and *swa*. The opening clause is the main clause; the following three clauses are subordinate to it.

(44) *frineð he for þære mænige* hwær *se man sie,*
seðe *for Dryhtenes naman deaðes wolde*
biteres onbyrigan, swa *he ær on dam beam dyde.* 112–14
[asks he before the many *where* the man is,
who for God's name would taste bitter death,
as he before did on the cross.]

The greater number of half-line, complete clauses found in A, 55, vs. 34 in B, emphasizes the terseness of A's style.

(45) þæt *wæs geara iu—ic þæt gyta geman—* 28
That was of years long ago— I remember that yet—

While there are only 5 subordinate clauses in A (each in a hypermetric line), there are 13 in B (each in a regular line). Furthermore, there are 33 complete half line clauses in A (each in a hypermetric line), but only 1 in the single hypermetric line in B. There is a greater number of half-line complete clauses in A than there is in B. Another stylistic difference is that the half-line clauses in B contain more words than do the half-line clauses in A

CONCLUSIONS. Analysis shows that the stylistic differences between A and B were brought about by the differences in linguistic practices of the poets. No evidence was found to support the charge of lesser poetic ability of the B poet as the main cause of the stylistic difference.

Analysis of the test variables and their percentage differences (presented in Table 1) clearly reveals the ones that cause the significant break in style and tone beginning at line 79.

Lexical, semantic, and syntactic function factors together with poetic factors all contributed to the stylistic differences. Although a single form in a varible set with a specific meaning can be statistically insignificant (too few occurrances), when it is combined with other members of the same set, the combined set becomes statistically significant (cf. appositives, subordinators, and substantives above).

The greater use of half-line appositives in A, contrasted to the very sparse use in B, defines the differences between the two halves. The use of reduced relative clauses and a total lack of complete relative clauses in A resulted in more short and terse half lines in A than in B. The extensive subordination and use of complete relative clauses in B further underscored the stylistic differences. The extensive use of hypermetric lines in A (32), adding more words and syllables to the affected half and full lines, did not reduce the impact of parataxis (successive periodic sentences) in A.

The combination of more subordinate clauses (hypotaxis) in B than in A, the extensive use of asyndetic paratactic clauses in A, and many fewer occurrences in B, emphasizes the style difference between the A and B sections.

Lastly, clause word order set patterning in A significantly affects the style of A, and widens the contrast with the style of B. Such set patterning is rare in B.

The difference in the story type of each half—the active narrative form of A contrasted to the quiet, more reflective homiletic form of B—reinforces the impact of the stylistic and tonal break caused by the linguistic differences.

The two halves of *The Dream of the Rood* together form a very satisfactory whole—the striking linguistic differences of each, combined with the story format differences, enhance the tragedy, glory, brilliance, and passion of the poem.

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[1] All citations are followed by their line numbers. Glosses of multiline citations are presented in square brackets to distinguish them visually from the citations themselves.

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A COGNITIVE-SPATIAL MODEL FOR LEXICAL SEMANTICS

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Modelling given and new. Models for the flow of information in texts distinguish between information which is 'given' and information which is 'new'. Given information is relatively repetitious of previous information, and new information is relatively unrepetitious. Such models differ among themselves to some extent on what constitutes information, what features underlie repetitiousness, and what degrees of repetitiousness constitute given and new (e.g., Chafe 1987, 1992; Firbas 1986, 1992; Givón 1983a, 1995; Halliday 1967, 1994).

One such model uses a computational procedure. A short text is lemmatized to reduce all pronominal items to their equivalent lexical antecedents, and all lexical items to a citation form. Each successive lexical item is then compared to all previous lexical items in the text within a limited span, typically 30. Each comparison is made by reference to a network of semantic relations in the form of a semantic graph. The graph holds all the lexical items abstracted from the lemmatized text in a hierarchy based on hyponomy and meronymy. The most general or most inclusive lexical items are situated near the root of the graph and the more specific or more particular items branch out from these successively. Relative semantic distance between any two items being compared is reckoned from the number of intervening items that have to be traversed from one to the other.

A segment of such a graph is illustrated in Figure 1 (overleaf)[1]. The semantic distance between 'people' and 'cult' is reckoned to be the cost of traversing from 'people' to 'thing' and from 'thing' to 'cult'. The first step is actually traversing from 'people' to 'people', and the cost of simple iteration is reckoned to be 1. The cost of traversing from hyponym 'people' to superordinate 'thing' is another 1, and the cost of traversing from superordinate 'thing' to hyponym 'cult' is another 1, for a total distance of 3.

Each lexical item in the lemmatized text has its relative semantic distance from each previous item in the span calculated from the graph. The givenness of each such item with respect to each previous item is taken to be the inverse of the distance, e.g., the relative givenness of 'people' with respect to 'cult' is 'one over three'[2]. The net relative givenness of any one such item is taken to be the sum of the 30 numerical components generated by comparison with each previous item in the span.

The output of this procedure is a version of the lemmatized text in which a numerical value is associated with each lexical item. Figure 2 shows a portion of the output for the text from which the graph segment in Figure 1 was derived ('The Classical Period', *Encyclopaedia Britannica* 1977, shown in Figure 3). Above each lex-

```
                  |-colony
                  |-court
         |-civic->|--1-
         |        |--2-
         |        |--3-
         |-cult---\   |-apollo
         |         >->|
         |  greek-/   |-dionysus
         |         |-mass
         |-matter->|
         |         |-mixture
         |-opposite--\   |-pole
         |            >->|
         |         6-/   |-rival
         |          |-model
         |          |-norm
         |          |-prototype
         |          |-standard
         |-pattern->|-13--\
         |          |      >->|-classicism
         |          |  10-/
         |          |-14--\
         |          |      >->|-romanticism
         |          |  12-/
         |          |--4-
         |         |-writer
         |         |-15-------\
         |-people->|           >->|-composer
         |         |  compose-/
|-thing->|         |-16--\
|        |                >->|-follower
|        |             1-/
```

Figure 1. Part of semantic graph for ‘Classical Period’ text

```
0.47              0.66   0.93                 1.32           0.81
0.02              0.03   0.04                 0.05           0.03
borrow  from the  visual art  of    the  same age  and  is   awkward when

0.58        1.69                             0.52 1.06       2.71    0.73
0.02        0.06                             0.02 0.04       0.09    0.02
apply  to   music in    that there were no    know model from classic antique

      0.93          0.63               0.61                 2.73 0.73
      0.03          0.02               0.02                 0.09 0.02
for   composer to   imitate a     full understand of   the  term depend on

      0.81  1.16               2.73 0.91                     3.65 1.08
      0.03  0.04               0.09 0.03                     0.12 0.04
a     clear conceive of   the  term romantic  for  the  two  term stand at

1.18      0.98      4.64 0.81           0.80       0.72     1.13       1.76
0.04      0.03      0.15 0.03           0.03       0.02     0.04       0.06
opposite  pole each term represent a    set  of    artistic ideal a     set
```

Figure 2. Excerpt from output for ‘Classical Period’ text.

The Classical Period

As in the case of the Renaissance, difficulties with terminology again arise with the label classical. Does it refer to a period of time, a distinctive musical style, an aesthetic attitude, an ideal standard, or an established norm? Again, the term was borrowed from the visual arts of the same epoch and is awkward when applied to music in that there were no known models from classical antiquity for composers to imitate. A full understanding of the term depends on a clear conception of the term romantic, for the two stand at opposite poles. Each represents a set of artistic ideals that has been in opposition to the other since both were recognized by early Grecian writers. As has been noted, the ancient Greek followers of Apollo established the ideal of classicism, whereas the cult of Dionysus produced the prototype of romanticism. A mixture of the two qualities has prevailed throughout recorded history, with first one and then the other in the ascendancy. Thus, there have been many 'classic' and many 'romantic' eras, but the labels have come to refer most specifically to the last half of the 18th century and the 19th century, respectively, because those periods represent most vividly the two tempers.

The social and political scene during the late 18th century was hardly a setting for a quiet, composed 'classical' age in view of the prevailing revolutionary spirit and colonial rivalry. The revolutionary movement did have a direct effect on music in that 'music for the masses' became a new ideal—music directly appealing to a large number of unsophisticated people who had previously been excluded from courtly entertainments.

Figure 3. 'Classical Period' text

ical lemma are two numerical sums, the upper being the net givenness from comparison with each of 30 preceding items; the lower number is the average. Experience with this kind of analysis suggests that a consistent demarcation between given and new information can be assigned: here it lies between the average values of .04 and .05 (Cummings 1995, 2000, forthcoming)[3].

1. ASSUMPTIONS AND PROBLEMS. Like other approaches, this procedure makes assumptions about what constitutes information, what features underlie repetitiousness, and what degrees of repetitiousness constitute given and new. For example, information is here equated only with the semantics of the individual lexical item. Other approaches might view information as grammatically defined segments of the clause (e.g., Halliday) or as complex semantic referents (e.g., Firbas) or as psychological entities (e.g., Chafe, Givón). Repetitiousness in this model is seen to be the degree of connectivity through a network formalism which interrelates all lexical items. Repetitiousness in other models might be what the speaker chooses to imply is repetitious (e.g., Halliday), what is formally cohesive or semantically consistent with the discourse (e.g., Firbas), or what is psychologically available for easy retrieval (e.g., Chafe, Givón). In this model the degree of connectivity which constitutes givenness is an arithmetical threshold on an open-ended arithmetical scale. In other models degree can be a simple binary contrast between given and new (e.g., Halliday), or it can be a gradation along a scale containing a

small number of contrasts (e.g., Firbas, Chafe). It is no surprise that this model produces results that vary to some degree from those of the other models referred to, but the understanding of each of these models is facilitated by the comparison of such results.

One assumption in the computational model which has proven troublesome relates to the semantic graph which serves as a data base for the derivation of degrees of connectivity. The graph is a spatial metaphor in which semantic distance is represented by degrees of actual distance along a line of connection. It was shown above that the line of connection in Figure 1 between lexical items 'people' and 'cult' is assigned a value of 3. The same procedure would assign to the connection between lexical items 'norm' and 'standard' the same value of 3. That these two pairs should have the same relative semantic distance is counter-intuitive. The intuition that the two pairs should have different semantic distances relates to the fact that 'people' and 'cult' are such general concepts that in this graph they serve to be hyponyms only of 'thing'. In contrast 'norm' and 'standard' are much less general in the sense that they serve as hyponyms to a superordinate itself much less general than 'thing', and accordingly are judged more closely related. The failure of the spatial metaphor to assign contrasting values to these pairs stems from the nature of the space itself, which is linear. Adjacent superordinate and hyponym are always at the same distance, regardless of their depth within the graph; therefore adjacent co-hyponyms also are always at the same distance. This distortion produces a number of counter-intuitive values, which, although they tend to be obscured by the process of summing over a span, take away from accuracy.

2. PROPOSED SOLUTION. An opportunity to solve this problem is afforded by dropping the metaphor of linear space for semantic distance and substituting the metaphor of curved space. In this metaphor, the distance between a superordinate and its hyponym (or between a whole and its meronym) is a primitive which varies as a function of the level of depth in the graph. The effect is to generate a space which metaphorically curves in on itself along the vertical axis. The graph which represents this space may be depicted pictorially as having a constant distance between levels of depth (as in Figure 5), but should be costed as having a constantly diminishing interval between levels starting from the root and going out to terminal nodes. The effect ensures that hyponyms of greater specificity are perceived as more closely related to their superordinates (and to their co-hyponyms) than are hyponyms of greater generality to their own superordinates and co-hyponyms.

All kinds of arithmetical functions could be chosen in order to produce a regular diminishment of the cost of traversing a graph downwards from the root through successive levels of depth. One such arbitrary choice is offered by the formula:

$$C = \frac{D - L}{D}$$

interval	1.0	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1	0.0
level	0	1	2	3	4	5	6	7	8	9	10

Table 1. Table of intervals between adjacent ranks to depth 10.

where **L** is a level of depth, **D** is the depth of the graph, i.e., lowest level, and **C** is the cost of traversing the interval from level **L** to the next lowest level. For example, any graph with depth of 10, and root level numbered '0', will have the values for the cost **C** of each interval shown in Table 1.

The semantic relation of identity has to be dealt with as a special case. The metaphorical distance which represents it must be an invariable, irrespective of the level of the item in the graph, and it must be significantly less than the distance of any real interval. The solution adopted here is to assign it the value of the lowest and therefore least interval in the graph. The graph itself is accordingly assigned a depth which is one level lower than that of its farthest extension. The identity interval is thus always one-half of the next least interval in the graph, which is the same proportion which was observed in the original, linear model for semantic distance.

The sense in which such a function relating cost to level in the graph is said to produce a curvature on the vertical axis can be understood by plotting the cumulative distance from the root of the graph to each successive level of depth. This plot is represented in Figure 4 (overleaf) for a graph with depth of 10. In this chart, the x axis represents increasing levels of depth, and the y axis represents increasing cost of traversal from the root. The costed distance between each pair of levels in the chart can be read from the table in Table 1. The curve proceeds from the value of '1' for traversal through the interval below level '0', the root. It terminates with the value of 5.5 for traversal from the root through the interval between levels 9 and 10.

However, in catering to this first problem of relative semantic distances, a second problem is revealed. If the relative semantic distance between co-hyponyms is now dependent on their depth, some particular semantic graph derived from some particular short text may show pairs of co-hyponyms of the same degree of generality distributed at different levels of depth. Similarly, pairs of co-hyponyms of different degrees of generality may be distributed in such a graph at the same level of depth. Such an effect is in fact observable in Figure 1, where the 'Apollo'/'Dionysus' pair and the 'colony'/'court' pair are at the same level and will now have the same distance interval. Intuitively it appears that the two cult figures are more closely related than the rather more general terms referring to civic entities.

To correct for this possibility, which stems from the lexical sparseness of short texts, a consistent degree of generality has to be associated with each successive level of depth. It can be observed from Figure 1 that most of the lexical items which are immediate hyponyms to superordinate 'thing' are relatively unrelated one to another. However, most of these which are superordinate themselves have two or more immediate co-hyponyms which are relatively related. Additionally various pairs of co-hyponyms in the graph could be labelled 'closely related' or even 'very

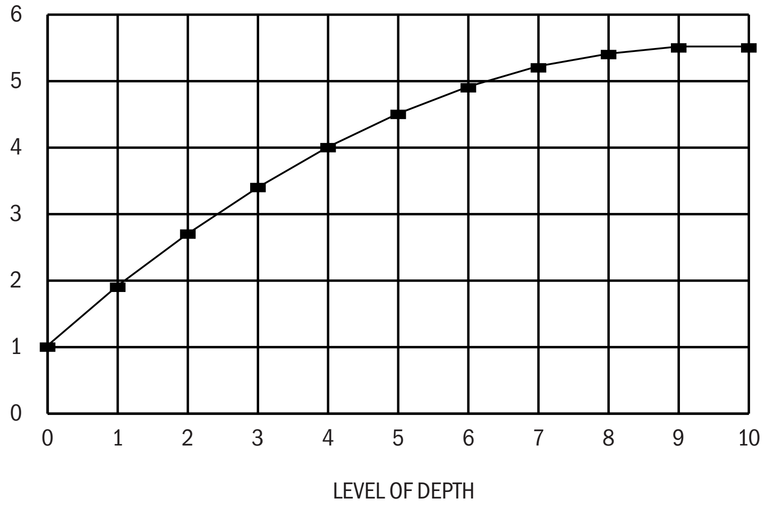

Figure 4. Distance curve for semantic network with depth = 10.

LEVEL	RELATEDNESS	EXAMPLE	NEXT INTERVAL
0	root	**all**	1.00
1	1st grammatical	**thing, process, quality**	0.86
2	2nd grammatical	**node_1**	0.71
3	relatively unrelated	**civic**, 'cult'	0.57
4	relatively related	'colony', 'court'	0.43
5	closely related	'apollo', 'dionysus'	0.29
6	very closely related	'18th_century', '19th_century'	0.14
7	identity	'cult', 'cult'	0.00

Table 2. Levels with associated degrees of relatedness for co-relations.

closely related'. These four categories will account for degrees by which pairs of actual lexical items in the text relate. Another two degrees of generality are postulated to account for purely grammatical labels close to the root of the graph. Thus for the text which underlies the graph in Figure 1, the levels of depth and their glosses given in Table 2 account for varying degrees of relatedness.

It can now be seen that some hyponyms in Figure 1, like the 'Apollo'/'Dionysus' pair, belong on levels more distantly separated from the level of their superordinates than originally supposed. To effect this separation, arbitrary nodes are introduced into the graph to extend branching. It would appear that the general effect of this innovation is to bring graphs which are limited in scope to the lexis of short texts closer in form to a general graph for the whole English lexicon. A portion

```
                 |-case
                 |
                 |        |-colony
                 |        |
                 |        |-court
                 |        |
                 |-civic->|-node_2
                 |        |
                 |        |--1-
                 |        |
                 |        |--3-
                 |
                 |-cult---\          |-apollo
                 |         >->|-node_3->|
                 |  greek-/          |-dionysus
                 |
                 |-effect
                 |
                 |-greek
                 |
                 |-mixture
                 |
                 |           |-pole
                 |           |
                 |-opposite->|-rival
                 |           |
                 |           |--6-
                 |
                 |                      |-model
                 |                      |
                 |                      |-norm
                 |                      |
                 |          |-general-> |-prototype
                 |          |           |
                 |          |           |-standard
                 |-pattern->|           |
                 |          |           |--2-
                 |          |
                 |          |-instantial--\
                 |                 label-|
                 |                       |    |-classic
                 |                 poles- >-> |
thing->|-node_1->|                 style-|    |-romantic
                 |                  term-/
                 |
                 |                      |-writer
                 |         |-creative-> |
                 |-people->|            |-composer
                 |         |
                 |         |-16--\    |-follower
                 |         |      >-> |
                 |            1-/     |-masses
```

Figure 5. Part of revised semantic graph for ‘Classical Period’ text

of the revised graph, with levels of depth representing consistent degrees of generality for co-relations, is shown in Figure 5[4].

3. RESULTS. The first result of the graph’s new form is to represent comparative distances between pairs of lexical items more convincingly. Table 3 offers some distance values from the older version of the graph which are problematic when compared, and equivalent values from the new graph structure:

Used as the data base, the graph in its new form also produces very different results in establishing numerical values for the relative givenness of each successive lexical item in a text. The first difference is that the range of average values for the givenness of text items is very much larger—for the ‘Classical Period’ text reaching from 0.03 to 6.79[5]. More significantly, this extended range divides itself into distinct bands of values. One highly separated band of discontinuous values represents the

PAIRS	OLD DISTANCES	NEW DISTANCES
apollo, dionysus	3	1.00
scene, setting	3	1.00
colony, court	3	1.29
political, social	3	1.29
political, movement	3	1.71

Table 3. Some previously problematic representations of semantic distances.

INTERPRETATION	RANGE OF AVERAGE VALUES
presence of lexical repetition	1.68–6.79
heavy lexical inference	0.21–0.58
lighter lexical inference & non-inferential information	0.03–0.19

Table 4. Bands of numberical values in output chart.

presence of lexical repetition. Another band of discontinuous values represents heavy lexical inference. A third band, of continuous values, ranges from lighter lexical inference down through low-end new information. Table 4 offers the ranges of these bands. Inspection of the output suggests that the most reasonable demarcation between given and new for this text is between the values of 0.19 and 0.21, that is, between band 2 and band 3.

As with previous analyses of this kind, the numerical output can be represented as a set of connected points over text, with the height of each point designating the average value for the degree of givenness of the associated lexical item. One page of such a chart is shown in Figure 6. The line connecting points ranges back and forth across the demarcation between given and new[6]. The text below is shown in both lemmatized and unlemmatized form. This part of the chart is relatively free from the effects of rhetorical selection and contrast which convert a lexically cohesive item into grammatically new information (Firbas 1992:34–35), so that the progress of the line suggests an intonational reading which is consistently plausible.

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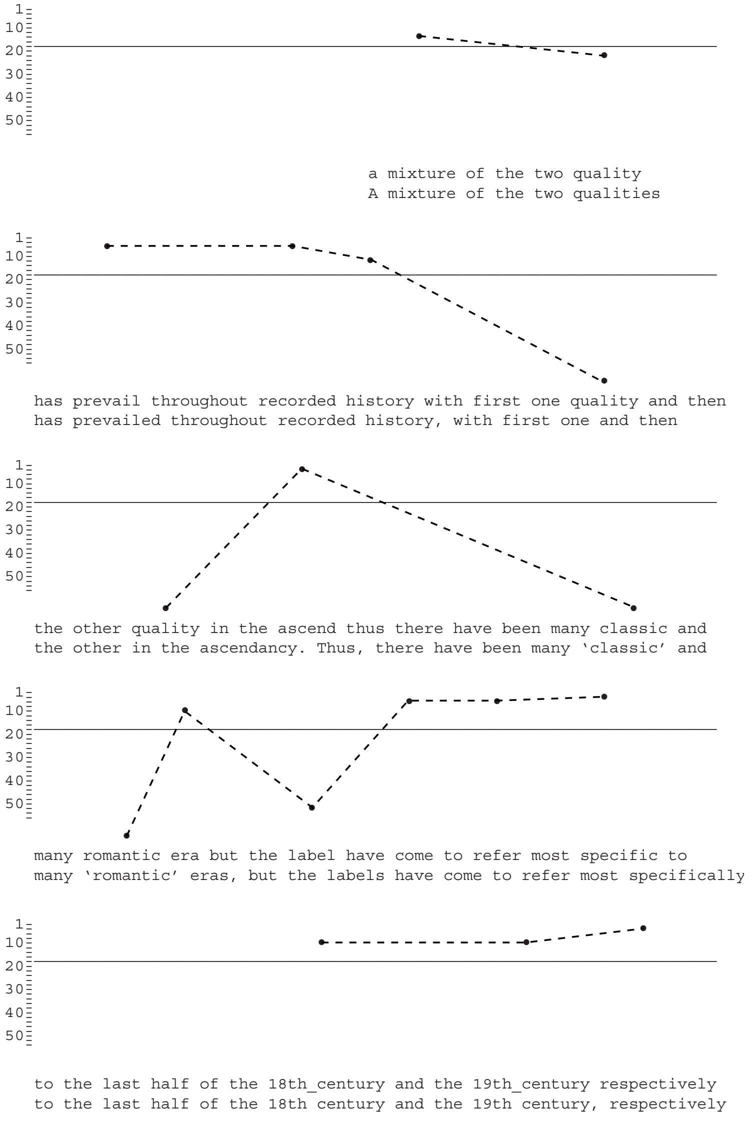
[1] The diagram is a computer output unedited except for bolding of items which don't occur in the source text but are postulated in the graph to account for co-relations. For notation cf. Cummings 1987, 1995.

[2] In fact, to render the scale of values for givenness exponential, the cost of traversal is raised to some whole or fractional power. Typically it is squared, as in the case of the values which are summed and averaged to produce the results shown in Figure 2.

[3] Estimation of the demarcation value between given and new is based on a reading of the text in terms of the Systemic-functional theory of 'Focus of Information' (Halliday 1967a, 1967b, 1994).



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a mixture of the two quality
A mixture of the two qualities

has prevail throughout recorded history with first one quality and then
has prevailed throughout recorded history, with first one and then

the other quality in the ascend thus there have been many classic and
the other in the ascendancy. Thus, there have been many ‘classic’ and

many romantic era but the label have come to refer most specific to
many ‘romantic’ eras, but the labels have come to refer most specifically

to the last half of the 18th_century and the 19th_century respectively
to the last half of the 18th century and the 19th century, respectively
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Figure 6. Part of chart of values for ‘Classical Period’ text.

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[4] Beyond these changes in procedure, the graph has also to some extent been rewritten from its condition in Figure 1 in order to improve its logic.

[5] Values for the first 30 items in the text are excluded since they are not based on comparison with a full span.

[6] To save space all values greater than 0.55 are simply represented as off-scale.

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METAPHOR AND MISERY: ENHANCING PSYCHOTHERAPEUTIC COMMUNICATION WITH SPANISH-SPEAKING CLIENTS

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Sooner or later every translator discovers that of any two languages, though these may be genetically, geographically, or even culturally related, language 1 may lack some semantic equivalents present in language 2 while making semantic distinctions that language 2 does not. As a matter of fact, despite the presence of semantic universals, semantic systems embodied in different languages are distinct and culture specific. And, within any language, every element belongs to a discrete network and occupies a specific niche in a greater singular set of relations that impinge on cross-linguistic communication (Wierzbicka 1996).

Though nearly all linguists do support at least some aspect of Whorfian relativism, most comparative semantic analyses have been limited to the study of grammars and of the basic elements of the lexicon. In recent years, some efforts have been made to compare larger linguistic units such as a text, partly due to the rise of the fields of Discourse Analysis (Brown & Yule 1983), Pragmatics (Levison 1983) and of Language Contact (Nichols 1992). Yet, there is still a segment of the language which bridges the lexeme and the text that has not been fully explored[1].

This paper then attempts to draw attention to the role of idiomatic expressions such as proverbs[2] in the area of cross-linguistic semantic studies. The framework is provided by the psychotherapeutic setting where, generally, a psychotherapist, who by virtue of his profession is proficient in the dominant language and culture of North America, is faced with the task of providing service to a clientele that is predominantly of Central and South American linguistic and cultural background. It is hoped that this study will provide insights useful not only in cross-linguistic psychotherapeutic settings but in the everyday communicative needs of American society. Today's increasingly diverse populations require their members to make at least some effort to be acquainted with the other languages and cultures that underlie the mainstream ones.

1. theoretical framework. A brief excursion in the available literature reveals that within the lexicon of a language, idioms are categorized as metaphorical references which are often so symbolic as to elude the understanding of the uninitiated. For instance, hearing the expression: *Since coming out of prison John has turned over a new leaf* leaves many beginning students of English rather puzzled. According to scholars, in fact, the meaning of an idiom is generally believed to be arbitrary because the metaphorical significance of the expression as a whole is unpredictable

from the individual meanings of its componential parts (Bréal 1964:294–304; Lakoff 1987:448; Lyons 1995:53). Lakoff suggests, however, that idioms are not necessarily arbitrary. Indeed, on closer scrutiny, the meaning of an idiom can be predicted simply by discovering the separate elements of the conceptual system that link it to its meaning. The first element of this three-pronged conceptual system consists of the *conventional image(s)* that are rooted in a specific culture (Lakoff 1987:446). Such are for example images of social stereotypes in addition to images of prototypical members of a linguistic category such as *flowers* or *cats*. The second element of this conceptual framework involves the speakers' *shared knowledge* of those same conventional images (Lakoff 1987:447). The last element that binds an idiom to its meaning entails one or more appropriate *metaphors*. These metaphors must already be part of the conceptual framework of the speaker, and furthermore, they must allow a linkage of the conventional image and its shared knowledge to the meaning of the idiom under investigation. It is only by following this formula that we are provided with the necessary motivation that makes the idiom 'make sense'. As a case in point, the meaning of the idiom *to keep someone at arm's length* is motivated by the conventional images that: a) the arm is put up for defense purposes and b) if the arm were to be let down the resulting shortened distance would be cause for harm. The meaning of this particular idiom is then motivated by two metaphors. The first metaphor suggests that intimacy equals physical closeness while the second relates social or psychological harm to physical harm. (Lakoff 1987:448).

By providing this schema, Lakoff quells the debate on the arbitrariness of idioms that had ensued mainly from discovering that idioms are complex semantic primitives whose overall meaning is not a function of the meanings of its parts.

Some idioms, however, are the resulting elliptic expressions of more complete utterances that are traditionally referred to as proverbs. Proverbs, also called adages maxims, precepts, etc., are succinct expressions articulating popular wisdom. Structurally, proverbs display cross language similarity as many may be divided into two equal parts which display parallel syntax, rhythm and links of rhyme and alliteration (Della Volpe forthcoming). The meaning of a proverb is more readily accessible from its componential parts than the meaning of an idiom, provided that one has access to its allegorical references. An allegory is an *extended metaphor* contained in a text in which the subject(s) and actions are used to understand and express aspects of concepts that relate to human experiences. As a case in point, within Western culture three areas contribute most of the allegoric references that appear in proverbs: The literary traditions, the religious texts and the oral traditions. The latter encompasses narratives such as folktales, children stories and a people's cultural experience including ideas and beliefs. Though the source and formulation may vary, often the basic message remains, as for example:

LITERARY TRADITIONS	RELIGIOUS TEXT	ORAL TRADITION
Neither a borrower, nor a lender be (Shakespeare *Macbeth* II, iii, 22)	*The borrower is servant to the lender* (Proverbs 22:7)	*He that goes a-borrowing goes a-sorrowing* (Simpson & Speake 1982:115)

When only part of a proverb is repeated, the abbreviated form becomes an idiom, as is the case of: *You are counting your chickens again*, in place of: *don't count your chickens before they are hatched.*

Because proverbs are perceived as types of idioms, they are customarily included in dictionaries of idioms rather than being part of a regular dictionary entry. Indeed, proverbs share with idioms the non-literal intended reference. *To run out of steam*, for instance, has lost the literal interpretation. This loss has occurred because an engine losing steam and coming to a halt is not a readily recognizable conventional image in this day of electric trains.

Proverbs, moreover, differ from idioms in that their literal meaning bears a direct iconic association to their intended reference. For example, there is a direct iconic parallel between the proverb: *a new broom sweeps clean* and its reference to a new office mate who goes about the office implementing extensive changes while casting aside all previous routine.

In fact, proverbs represent a rich common cultural patrimony of folk knowledge and wisdom. In other words, they rest on a set of conventional images whose knowledge is shared by all the speakers of a specific culture and whose motivating metaphors are readily transparent because the allegoric reference is familiar.

Two salient characteristics, then, distinguish proverbs from idioms. The first is that proverbs are consciously uttered with the intent to caution as in *don't count your chickens before they are hatched* or to scold as in *the devil finds work for idle hands* or even *it is no use crying over spilt milk*. Indeed, the speaker is aware that the listener will accept the common bases of this common wisdom and that, under the circumstances, a more direct intervention would fail in the intended warning or reprimand, as it might break the acceptable rules of polite interactions.

The second distinguishing feature of proverbs is their use to point out ways to come to terms with human existence or to comment on common life experiences. For example, *blood is thicker than water* can be said in a situation regarding one's inappropriate behavior towards relatives or *what goes around comes around* which can be said to remark about someone who has received a tort. It is this latter characteristic of their usage that makes them particularly useful in a psychotherapeutic setting. We shall address this topic below.

2. A PRACTICAL APPLICATION. Extending to proverbs the theoretical framework postulated by Lakoff finds an immediate fruitful application in today's psychotherapeutic approach inasmuch as within a typical psychotherapeutic setting, patient-generated metaphors provide a valuable tool to enable them to achieve the much sought after therapeutic changes (Schwanenflugel 1991).

The practitioner, however, often faces two caveats. First, within today's managed care, psychotherapy is time-limited. As a result, the therapist is the one who is often forced to generate the metaphors in place of the client. Second, because it is the mental health provider who must originate the psychotherapeutic metaphor, he or she must posses a coherent system of explanation consonant with that of the patient. This requirement is necessary in order to find solutions to the client's personal human problem and help him or her re-evaluate and reframe his or her past and present experiences.

This situation presents a formidable task, particularly for the practitioner who works with a clientele of individuals who are not completely accustomed to the dominant North American language and culture. Such is the case, for instance, of psychotherapists working with the Latino migrants of Southern California. Even in their country, many migrants have benefited little from formal schooling and often come from an urban poor or agrarian setting. As a result, they posses a set of cultural images and of shared knowledge that are extraneous to those ordinarily held in the dominant language and culture of the United States. In such settings, the use of culture-specific metaphorical expressions, such as Latin American proverbs, allows the therapist to access these patients' particular set of culture-specific conventional images, the cultural knowledge that accompanies them, and the metaphors that, though unfamiliar to the therapist, 'make sense' and strike a chord in their clients.

The use of proverbs specific to the culture of the client, in fact, provides a means of therapeutic communication that can motivate him or her to achieve therapeutic change without having to change his or her own explanatory model of reality. This is often done simply to please the doctor, but in such cases, the therapy proves largely ineffective because there is no resonance in the patient's cognitive and emotive framework (Dobkin-de Rios 2000). On the other hand, when the patient discovers the motivation behind the familiar proverb not only will he effect the cognitive restructuring necessary to relieve his symptoms and heal the misery experienced, but he will do so in a timely manner.

Dr. Marlene Dobkin-de Rios, who has long advocated a culturally responsive psychotherapeutic approach, has utilized this technique with a data base of more than 500 Hispanic immigrant clients over the last five years. Evidence of the efficacy of her treatment derives from clinical observations and increased referrals. Needless to say, current utilization review procedures in Management Care Organizations entail the rating of psychotherapists' performance. But, while we do not have access to this data, Dr. Dobkin-de Rios referrals have increased significantly over this period.

Following are some examples of proverbs she has most widely used in her practice and which have proved effective in specific psychopathological situations with patients heretofore irresponsive (see also Dobkin-de Rios & Achauer 1990).

- *Tanto bajo el cántaro al agua hasta que se quiebra*. 'The ladle dips into the water so much that it finally breaks'. The use of this proverb enabled several patients to fully appreciate the stress they were under and its effect on their health making them finally able to implement remedial strategies to address their problem.

- *El que no agarra consejo no llega a viejo.* 'He who does not seek counsel will not live to old age' permitted some of her clients to fully understand the import of accepting advice in anger management classes.
- *La leña enseña.* 'A stick of firewood teaches' (the underlying conventional image suggests that someone must knock you over the head with the firewood) made it possible for some patients to fully grasp that, at times, people only learn the hard way.

3. CONCLUSION. Though Dr. Dobkin-de Rios is continuing her preliminary investigation in this area, several tentative conclusions can be drawn. Studies in cross-linguistic semantics support the notion that people differ less in their cognitive skills like generalization and abstraction than in the culturally based metaphors by which they live (Jackendoff 1983). Hence, trying to convince a patient that the psychotherapist's own cultural explanatory model of the world is more appropriate or efficacious is indeed a possible endeavor. However, such a task requires long periods of time. Time which is unavailable in today's managed health care milieu and may still be ineffective in the end. There is, therefore, a need to develop time-constrained culturally specific psychotherapies capable of bridging the gap between the psychotherapists' perspective of illness, which drawn from scientific rational medicine, and the patient's perspective of his own illness, which relates to how his or her life has been disrupted and what are his or her expectations and understanding of the problem and of the treatment. One of the most effective tools available to the therapist appears to be the use of culture-specific proverbs. Through the use of proverbs the psychotherapist can readily access the patient's inner resources, memories, dreams, goals, fears and hopes without being too intrusive.

To sum up, this paper suggests that the analytic framework proposed by Lakoff to clarify the non-arbitrariness of idioms (Lakoff 1987:448) be extended to the analysis of proverbs. Support for this stance can be adduced by the use of proverbs, in an albeit preliminary study, in managed psychotherapy for Latino migrant communities in the Southern California area. Beyond providing supporting data for Lakoff's model, this experiment also suggests that using distilled cultural wisdom contained in culture specific proverbs or sayings can extend beyond the clinical practice with Spanish speaking migrants in Southern California to other ethnic groups. And further, this tool has implications not only for psychotherapy but also for everyday communicative needs in today's society where diverse populations are still in the process of acculturating to the U.S. dominant culture.

[1] Some comparative work has been done on idiomatic expressions and phrasal verbs, but these are still construed as one linguistic unit.

[2] Though several extensive collections of proverbs are available, these collections are intended to provide comparisons of similarities across culture. To my knowledge none has focused on linguistic analysis.

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CLUSTER ANALYSIS AND STYLISTIC PATTERNS IN A POPULAR GENRE

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This paper is an essay in what used to be called stylistics, a study in the spirit of those reported, for example, in Sebeok (1960 [1958]). It is also an exercise in discourse analysis, though not an attempt to construct a grammar of discourse, as in Longacre (1983, 1996) or Grimes (1975). This paper is complementary to studies like Nameri (1995) and closer still to Rudanko (1997).

Underlying this study are a few assumptions about choice and constraint in language variation: all human languages have much the same set of communicative functions; different languages exploit different subsets of their resources; given the general constraints imposed by universals of human language and cognition and specific constraints imposed by the grammars of specific languages, there exists a restricted range of choices in a given situation. This last assumption implies that users have choices. Most cognitive operations are, in Gazzaniga's (1998) view, unconscious.

Methods employed here are also rather simple. A sample of written English drawn from ten popular detective novels, was constructed. A particular linguistic variable, in this case, occurrences of what have been called 'deep cases' (Fillmore 1968), 'thematic roles' (Gruber 1965), or 'participant roles' (Givón 1995), were counted and the proportions of each case in each sample were compared. The null hypothesis was that the proportions of the various cases would not differ significantly across the various texts sampled.

Pilot studies indicated that using the commonly accepted inventory of cases, taken from O'Grady, et al (1997) and given in Table 1, did not provide sufficient discrimination to distinguish the style of one language user from that of another.

Mills (1997) proposed a much richer system of 'shallow cases.' In this system there were 14 cases: Agent, Theme, Patient, Experiencer, Possessor, Partitive, Instrument, Containing, Touching, Near, Far, To, Away, and Through. Using this inventory of cases, results were suggestive, but hardly conclusive. Chi-square tests on the proportions of various cases used by various authors yielded statistically significant results, but with such huge numbers of data points (nearly 16,000 cases) statistical significance was almost guaranteed. In any case, statistical significance does not equal stylistic significance. A later paper, Mills (1998), using a larger sample, indicated that two of the cases, the Partitive and the Near, were irrelevant to stylistics in English.

For the present study, the corpus consisted of a set of samples taken from ten novels in the popular culture genre of the detective story. Sources of linguistic data for the earlier studies are listed in Table 2.

Agent	the entity that performs an action
Theme	the entity undergoing an action or a movement
Source	the starting point for a movement
Goal	the end point for a movement
Location	the place where an action occurs

Table 1. Some thematic roles defined.

Barnard, Robert. 1989. *Death and the chaste apprentice*. New York: Dell.
———. 1993. *A hovering of vultures*. New York: Charles Scribner's.
Cross, Amanda. 1981. *Death in a tenured position*. New York: Dutton.
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Grafton , Sue. 1988. *'E' is for evidence*. New York: Bantam.
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Hillerman, Tony. 1988. *A thief of time*. New York: Harper & Row.
———. 1996. *The fallen man*. New York: Harper Collins.
McBain, Ed. 1981. *Rumpelstiltskin*. New York: Warner.
———. 1996. *Gladly the cross-eyed bear*. New York: Warner Books.

Table 2. Sources of case data.

Agent	an entity, typically animate, that carries out an action
Patient	an entity that is either in a state or undergoes a change of state
Dative	variously, an animate entity affected by an action, a recipient, a beneficiary, an 'indirect object'
Genitive	a possessor, whether animate or inanimate
Theme	an entity, animate or inanimate, which is literally or metaphorically moved by an action
Instrument	an entity used to carry out an action or effect a change of state
Inessive	location inside a place
Adessive	location at or near a place or, metaphorically, a time
Abessive	absence or location away from a place, lacking
Allative	movement to or toward a location
Illative	movement into a location
Elative	movement out of (from the inside of) a location
Ablative	movement away from (the exterior of) a location
Translative	movement through or across a path

Table 3. Cases.

Work/Case	Agent		Patient		Dative		Genitive		Theme		Instrument	
	n	%	n	%	n	%	n	%	n	%	n	%
Barnard 1	**128**	13	**178**	18	**156**	16	**159**	16	**63**	6	**19**	2
Barnard 2	**154**	14	**284**	26	**153**	14	**118**	11	**93**	8	**15**	1
Cross 1	**257**	13	**494**	25	**450**	23	**219**	11	**88**	4	**28**	1
Cross 2	**248**	12	**570**	28	**511**	25	**216**	10	**80**	4	**35**	2
Grafton 1	**152**	12	**319**	25	**156**	12	**194**	15	**70**	5	**26**	2
Grafton 2	**240**	13	**470**	26	**315**	18	**227**	13	**51**	3	**32**	2
Hillerman 1	**141**	12	**308**	26	**112**	9	**170**	14	**45**	4	**42**	3
Hillerman 2	**159**	18	**224**	26	**123**	14	**99**	11	**27**	3	**17**	2
McBain 1	**248**	13	**533**	27	**272**	14	**257**	13	**49**	3	**39**	2
McBain 2	**454**	14	**934**	29	**445**	14	**395**	12	**83**	3	**63**	2
Totals	**2181**		**4314**		**2657**		**2054**		**649**		**316**	

Table 4a. Central cases.

A chapter was selected at random from each of these works and scanned into a word processor file. A total of 41,955 words of text was analyzed.

The case inventory for the present study was again expanded to 14 cases, with the additional cases being in the realm of 'motion' or 'lative' cases. Table 3 gives the cases and their definitions. Definitions of cases are taken from a variety of sources: Fillmore (1968), later Fillmore (Dirven & Radden 1987), Gruber (1965), Cook (1989), Blake (1994), and in particular Crystal (1997).

Results of this study are given in Tables 4a, b, and c.

It should be clear from inspection of these tables that the proportions of the various cases varies widely from author to author and rather widely from work to work within a given author. With so many cases, statistically significant differences would be less remarkable than their absence. Results over all authors and all cases are significant (χ^2=663.3, df=117, p <. 001).

However, as already noted, statistical significance does not imply stylistic significance. First, there is statistically significant variability between the two samples taken from each author. The samples from Barnard show large differences in Patient, Genitive, Illative and Translative. The samples from Grafton show substantial differences in Dative, Theme, and Illative. The samples from Hillerman show substantial differences in Agent and Dative cases. The samples from Cross show relatively small differences in all but the Allative case. Only the two works by McBain show non-significant differences between the two samples: only McBain is consistent in his use of case.

When we consider Tables 4a, b, and c as a single large table and examine the proportions of the various cases over all works by all authors, the results are, as noted, statistically significant. Figure 1 shows the percentages of the three Central cases—Agent, Patient, and Dative—for all the works examined.

Work/Case	Inessive		Adessive		Abessive	
	n	%	n	%	n	%
Barnard 1	47	5	103	11	39	4
Barnard 2	45	4	112	10	41	4
Cross 1	74	4	160	9	51	3
Cross 2	64	3	176	8	59	3
Grafton 1	39	3	148	12	36	3
Grafton 2	47	3	177	10	63	4
Hillerman 1	37	3	151	13	51	4
Hillerman 2	15	2	100	11	25	3
McBain 1	79	4	237	12	87	4
McBain 2	137	4	364	11	121	4
Totals	584		1728		573	

Table 4B. Local cases

Work/Case	Allative		Illative		Elative		Ablative		Translative		Totals
	n	%	n	%	n	%	n	%	n	%	
Barnard 1	34	4	20	2	8	1	17	2	35	4	970
Barnard 2	40	4	8	1	13	1	19	2	15	1	1110
Cross 1	64	3	13	1	24	1	33	2	30	2	1985
Cross 2	30	1	16	1	14	1	26	1	26	1	2071
Grafton 1	50	4	23	2	12	1	26	2	28	2	1279
Grafton 2	66	4	16	1	14	1	35	2	41	2	1794
Hillerman 1	40	3	20	2	18	1	31	3	40	3	1206
Hillerman 2	30	3	11	1	6	1	21	2	16	2	873
McBain 1	55	3	18	1	11	1	17	1	43	2	1945
McBain 2	103	3	26	1	24	1	40	1	72	2	3261
Totals	512		171		144		265		346		16494

Table 4C. Motion cases.

When we examine the frequency of cases in each individual cell in Table 4, particularly when we use the marginal totals in Table 4 to calculate the expected frequencies, as one would do when calculating a chi-square test by hand, we can use the results to interpret Figure 1. First, as I have maintained for several years now, variation in the occurrence of the Agent case plays no part in distinguishing the style of one English user from that of another. Though the second sample from Hillerman shows a peak for Agent, the first sample actually displays one of the lowest uses of Agent of all the samples.

For Patient, Barnard shows fewer occurrences than we would expect, and McBain shows more.

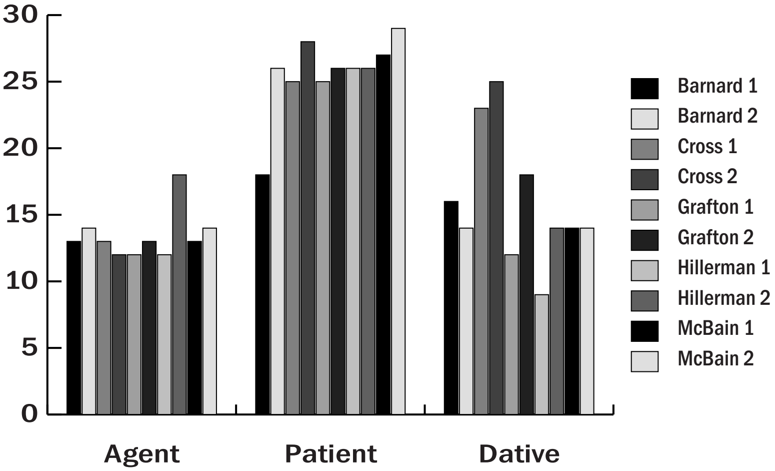

Figure 1. Central cases.

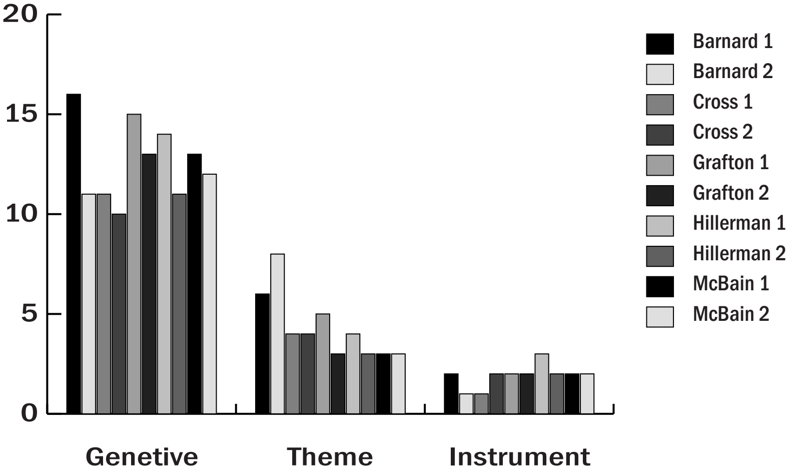

Figure 2. Peripheral cases.

But it is with the Dative case that variability makes itself most evident. Barnard, Hillerman, and McBain consistently use the Dative less than we might expect. Grafton shows fewer occurrences of Dative than expected in one sample and more than expected in the other, so we should probably be conservative and set aside the Dative data for Grafton. Cross overwhelmingly uses the Dative, as Figure 1 shows. Although it is risky to generalize from a small sample—one chapter from two books

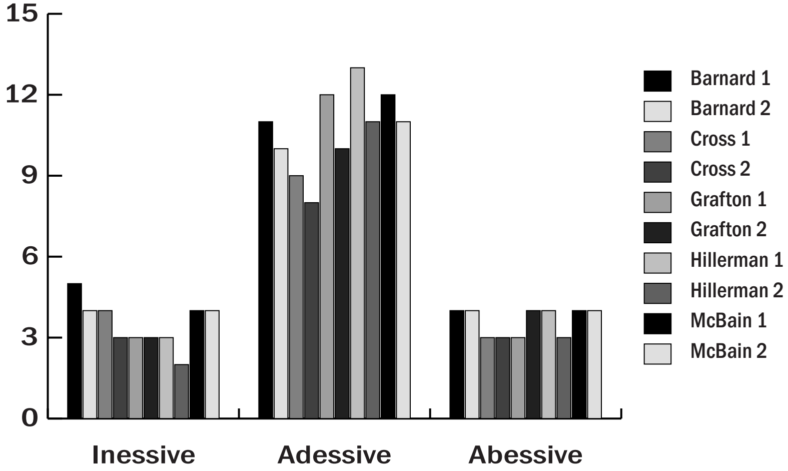

Figure 3. Locative cases.

by each author, we might say that Cross's style is experiential, reflective, and not especially spatial.

When we look at the more peripheral cases—Genitive, Theme, and Instrument—we see the results displayed in Figure 2.

Here, again, we can use the observed and expected cell frequencies from Table 4 to interpret the results. One of the Barnard samples shows a high value for Genitive; the other shows less than expected. We set aside data that are inconsistent from sample to sample. Cross consistently shows fewer occurrences of Genitive than expected, while Grafton shows more than expected. The Genitive is the only case where Grafton shows much departure from the other authors. Theme serves to distinguish Barnard's style from that of McBain. Barnard shows more occurrences of Theme, and McBain shows fewer than expected. For entities affected by the verb, McBain tends to have Patients, and Barnard tends to have Themes. Rudanko (1997), following Cook (1989), prefers to subsume these two cases under the single term, Object, and to distinguish the Stative Object Os from other objects. Thus, Barnard's style is in a sense objective, while McBain's is stative.

As Figure 2 shows, the Instrument case, like the Agent, appears to play little or no role in distinguishing one style from another.

For the three locative cases—Inessive, Adessive, and Abessive—we see the results in Figure 3. The Inessive case distinguishes Barnard from Hillerman. Results tend to be close, but Barnard uses the Inessive more than expected, and Hillerman less. The Adessive case distinguishes Cross, who uses it much less than expected, from Hillerman and McBain, who use it more. For the Abessive, only McBain, who uses it more than we might expect, stands out.

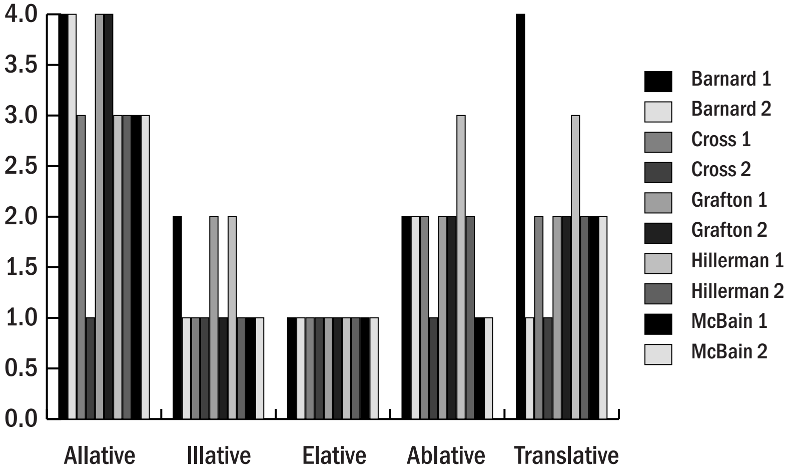

Figure 4. Motion cases.

Figure 4 shows the uses of the 'lative' or 'motion' cases. Once again, examining Figure 4 in light of Table 4, shows us that most of the motion cases play little part in identifying styles. Allative, Illative, and Elative do not show any consistent trends. The Ablative can be used to distinguish Hillerman, who uses it much more than expected, from McBain, who uses it much less. Translative case appears relevant only to the style of Cross, who tends to have an experiential, motionless style.

Style is a multivariate phenomenon. Most analyses have tended to treat stylistic variables as univariate data. A few workers in stylistics have applied factor analysis to their data, notably Finnegan and Biber (Biber 1988).

Another approach to stylistics might use cluster analysis (Anderberg 1973), which has been used in fields such as archaeology and biology. Aldenderfer and Blashfield (1984) have written an accessible introduction for social scientists.

Cluster analysis is a set of techniques for examining relationships and patterns in data, not a means of testing hypotheses. Cluster analysis makes few assumptions about data, and while it is thus widely applicable, it is limited in inferential power. Finally, there are many techniques for cluster analysis, using many measures and methods, and there is no set of standards for what is appropriate when. What follows must thus be viewed as merely suggestive.

Figure 5 displays the dendrogram for the hierarchical clustering of all the variables used in this study. Examination of the dendrogram in Figure 5 suggests that the data based on frequency counts of 14 cases reveal three large-scale clusters. We find the two samples from Amanda Cross, which cluster rather tightly together and are, as a cluster, farthest from the other samples. At the second level of clustering, we find two clusters that are at about the same distance. One cluster consists of the two works by Ed McBain, which are themselves tightly clustered and which in turn

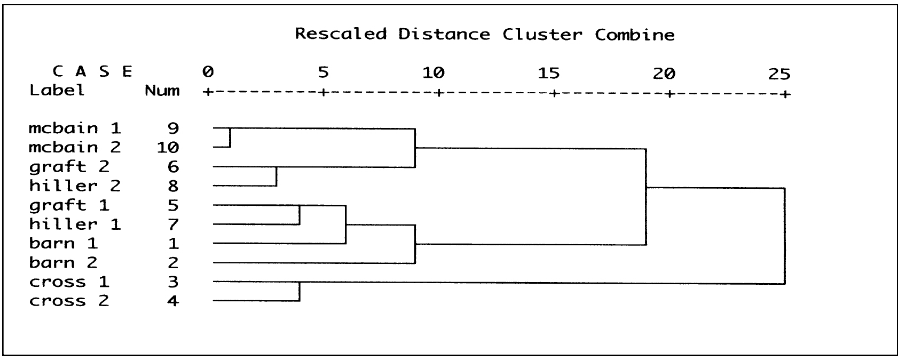

Figure 5. Cluster analysis, all cases by author and sample. Chi-square measure. Dendorgram using Ward method.

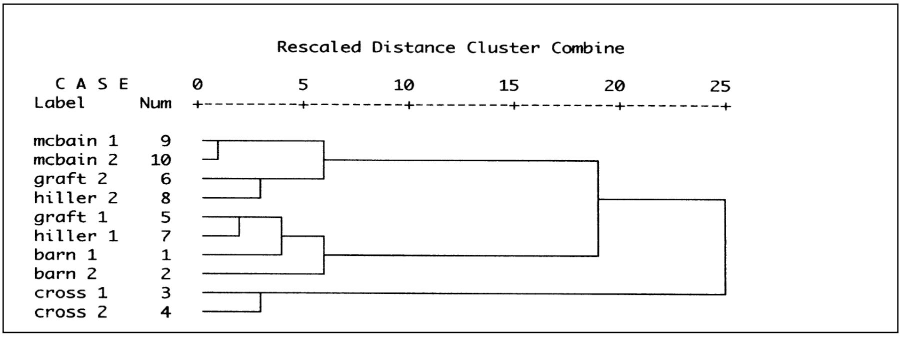

Figure 6. Cluster analysis, restricted set of cases by author and sample. Chi-square measure. Dendorgram using Ward method.

combine with one each of the works by Sue Grafton and Tony Hillerman. In the other cluster, we find the other two works by Grafton and Hillerman, which combine at a higher level with the first sample from Robert Barnard, which combines at a still higher level with the second sample from Barnard. One interpretation of Figure 5 is that Cross and McBain exhibit more cross-sample stylistic consistency than do Hillerman, Brafton, and Barnard.

Referring again to Table 4, we can see that Inessive, Abessive, Allative, Illative, Elative, Ablative, and Translative cases constitute a very small portion of the total sample. All of these cases (2,595) amount to about 16% of the data, about the same, combined, as the Dative (2,657). And the contribution of many of these cases to differentiating among styles is relatively scanty. It is likely that the system of cases used for analysis is over-elaborated at this point. Following hints from Lakoff and Johnson (1999) on spatial location and movement in space as primary metaphors in human cognition, I combined Inessive, Adessive, and Abessive into a single Locative case, and all of the 'lative' cases into a single Motion case. Given that many languages, especially Finno-Ugric languages, express many notions of possession through the Adessive case, I also combined the Genitive with the Locative. Finally, given that the Instrument does not contribute to identifying styles, I folded it into the Theme. A cluster analysis for these reconstituted cases is given in Figure 6.

Here, we can see the same relationships among the restricted set of variables as in Figure 5. The close relation between the Cross samples and the McBain samples shows up. And we find the same tendency of one of each of the Grafton and Hillerman samples to cluster with the two McBain samples, with the other Grafton and Hillerman samples clustering more loosely with the two Barnard samples. Thus, it appears that combining the three locative cases into a single case and combining the five 'lative' cases into a single motion case results in little loss of information.

A reconstituted Table 4 (not shown), viewed in light of Figure 6, yields the following generalizations about individual styles. Barnard's work is characterized by more occurrences of Theme and fewer of Patient and Dative than we might expect. Cross has the most experiential, least spatial style of all. Her closest clusters are with Dative and, a bit less closely, with Agent. Cross's style clusters farthest from Locative and Motion. Only Motion is really relevant for the styles of Grafton and Hillerman, although Grafton also has links to Patient and Hillerman to Agent. Hillerman 1 is relatively far from Dative, and Hillerman 2 is even further from it. Finally, McBain 2 has a strong link to Locative and McBain 1 has a fairly strong link to Patient. Both of the McBain samples are far from Dative and even further from Theme.

What these last analyses seem to indicate is that there are probably six underlying dimensions relevant to English style, at least in the mystery novel: Agency, Stativity (represented by Patient), Experientiality (represented by Dative), Objectivity (represented by Theme), Spatial Location, and Motion in space. What is particularly interesting is that most case grammar studies in stylistics have tended to focus on the Agent, the case that appears to contribute least to the identification of styles, at least in English in this genre. I intend to follow up on these dimensions with different sampling techniques and for different genres in the future. In particular, limiting this analysis to one chapter from each of two works by each author leaves us with questions about the reliability of these findings. Expanding the analyses to other genres and using different sampling techniques should allow us to test these results.

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LEXICAL MEANINGS: BETWEEN GRAMMAR AND THE CONCEPTUAL MODEL

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1. TREATMENT OF THE LEXICON IN SYSTEMIC LINGUISTICS. This paper has two purposes. The first one is practical: it explores the lexical resources that are necessary for the task of multilingual generation (MLG). A source for generation is a formal model of some domain, such as a device, system or state of the world, from which descriptions of this domain in several target languages are generated. The research presented in this paper is mostly based on generation of descriptions for software manuals and on-line helps. The linguistic theory which is used in this research is systemic-functional linguistics (SFL). This leads us to the theoretical stance of this paper: a search for the proper treatment of lexical meanings in SFL.

According to Halliday (1978, 1985) linguistic resources are organized in three strata: phonology, lexicogrammar and semantics. Each stratum is designed as a level of abstraction, which realizes meanings of the stratum higher than itself. Language as an integral system realizes meanings from an additional stratum of conceptual representations, which is above language (sometimes in SFL this stratum is called 'context', cf. Halliday & Matthiessen 1999:383). This design is also supported in SFL-based multilingual generation (Matthiessen & Bateman 1992), in which the conceptual representation is an ontology for a problem domain (in this case, software applications). For the purpose of the paper, I refer to a computational model of this ontology as a 'Conceptual Model', (hereafter CM). The CM is independent of all target languages and covers such concepts as SELECT, BUTTON, DIALOG-BOX[1] and their configurations. The special component called 'text structurer' is responsible for the realization of a set of CM statements into a set of semantic statements which represent a sequence of sentences which form a text. Semantic resources are organized in communication-oriented terms, so they correspond to meaningful linguistic units, like clauses, clause complexes, nominal groups, etc., rather than to conceptual categories which represent the structure and functionality of software objects.

The set of general categories is called the Upper Model (UM), which may be language-dependent, but should be independent of a problem domain. A detailed description of the UM design principles is given in Bateman 1992. In short, the UM serves as a classification of most abstract grammatical meanings.

The second stratum of language, the lexicogrammar, is treated in SFL as the resource for wording of semantic configurations of the Upper Model; for example Figures are realized as clauses, while the Actees of Directed-Actions are realized by the lexicogrammar as the direct complements of their respective verbs, if voice options are [effective:active]. Thus the natural place for the lexicon is in the lexicogrammar, in which concrete lexical items are considered as the most *delicate* grammatical choice (*delicacy* is understood in SFL as succession of paradigmatic classifications). This view has both theoretical (Hasan 1987) and practical grounds (Bateman & Sharoff 1998). The theoretical reasons are related to the fact that language employs generalizations, which are imposed upon the lexical stock, so that its items follow regular grammatical patterns. Just this kind of regularity is captured by the UM, so lexical items for transitive verbs have a feature called directed-action-process. This means that abstract UM meanings mediate entirely between CM concepts and corresponding lexical items.

With respect to multilingual resources, the practical reasons for form-based considerations of the lexical stock are based on the greater functional congruence between languages at the higher ranks of grammatical descriptions, while at the lower ranks the word choice often influences idiosyncratic realizations. Consider the following three English and Russian translation-equivalent pairs:

(1) English: *X resembles Y* *X is like Y* *X is similar to Y*
Russian: *X napominaet Y*-ACC *X podoben Y*-DAT *X pohodit na Y*-ACC

These sentences express the single figure Resemblance-comparison (a subclass of 'Being & Having' figures) using different case markers or prepositions for the objects being compared. A realization of some concrete lexical choice is achieved in the lexicogrammar by insertion of corresponding groups and preselection of their cases.

2. GENERATION OF SOFTWARE MANUALS: A CASE STUDY. Though the above-mentioned theoretical and practical reasons are quite convincing, it is hard to deny that the semantic side of the lexical stock really exists, since one of the functions of language is the realization of the objects in the conceptual stratum by means of words. Otherwise, an admittedly functional approach to language is eventually similar to extreme cases of formal semantics, which 'is happy to denote the meaning of *dog* as DOG and consider its job done' (Nirenburg & Raskin 1996:16). Apart from this methodological consideration, there is also a strong practical need to apply the theory in the generation of concrete sentences.

For example, in English in the register of software manuals, the normative use of expressions for CHOOSE follows the metaphor of *extraction* of an object *from* a location:

(2) *choose Multiline from the Polyline flyout*

so this location fills the semantic slot Source; while the same conceptual meaning is rendered in Russian as

(3)	*vyberite*	*Multiline*	*v*	*palitre*	*Polyline*
	choose-IMP	Multiline	in	palette-LOC	Polyline

So the Russian follows a metaphor of *searching* foran object *in* a location. This leads to the use of another type of UM slot: spatial-locating. The choice between spatial-locating and source is not a question of greater delicacy, as in the case of resemblance in example (1), in which the single slot type range suffices for Y in the semantic specifications. One reason for this is that a configuration with *vybrat'* + source is also possible in Russian (even in the same register), if the metaphor of extraction is used, for example:

(4)	*vyberite*	*iz*	*etih*	*sposobov*	*podhodyashchij*
	choose-IMP	from	these	methods-GEN	appropriate-MASC.SING
	choose an appropriate method from the list				

Another problem in multilingual generation is presented by the CM concept SNAP, which is typically realized as *snap* in English, while Russian lacks a verb which could be considered a good translation equivalent of *snap.* This leads to expressions with different grammatical structures. For example, a Russian version of the English sentence *the arc snaps to the endpoint* is either (5) or (6):

(5)	*duga*	*privjazana*	*k*	*konechnoj*	*tochke*
	arc	attach-PASS	to	end	point-DAT
(6)	*duga*	*prohodit*	*cherez*	*konechnuyu*	*tochku*
	arc	passes	through	end	point-ACC

Both grammatical configurations in Russian differ from the English due to difference in available lexical options and in verbal aspect. Thus the lexical realization of CM concepts leads to alterations in a *semantic* configuration of the message. In particular, choice of lexical items engenders metaphors which influence UM choices.

One more source of lexical influence concerns language-dependent co-occurrence restrictions. For example, the English verb *choose* can be used in any expression for selection of an action by means of the mouse-controlled pointer, e.g., *Choose the OK button; Choose File:Save.* However, the 'translation-equivalent' Russian verb *vybrat'* cannot be used in the first case:

(7)	**Vyberite*	*knopku*	*OK*
	Choose-IMP	button-ACC	OK

Another verb *nazhat'* 'press' is required for this action, so the correct expression is *Nazhmite knopku OK* 'Press the OK button'. However, *vybrat'* is perfectly good in the second example:

(8) *Vyberite punkt File:Save*
Choose-IMP item-ACC File:Save

This difference is caused by the lexical semantics of the respective Russian verbs: *vybrat'* (*choose*) means selection of an option from a number of possibilities, while it cannot denote a physical action implied by this selection (the action of pressing in this case). On the other hand, **Nazhmite punkt File:Save* (**Press File:Save*) is ungrammatical both in Russian and English, because *nazhat'* (*press*) is strongly associated with a physical action. But choosing an item in a menu is more a logical choice than a physical action, unlike choosing a virtual button in a dialog box, even though both choices are effected by pressing the real mouse button.

Representation of a conceptual specification in language-dependent semantic terms requires not only assignment of correct grammatical roles, as in examples (2)–(6), but the set of participants of a semantic specification itself is not fixed across languages and often depends on lexical options. The English expression '*The AutoCAD Text Window appears*', which is classified as a figure of Happening, is rendered in Russian as:

(9) *Na ekrane poyavitsya okno AutoCAD Text Window*
On screen-loc *appears window*-nom *AutoCAD Text Window*

This grammatical configuration is described as a locative circumstantial figure (a subclass of Being & Having according to the UM). Unlike its English counterpart, the Russian sentence requires expression of a location for the window: *na ekrane* (*on the screen*), so the place on which this object appears should be inferred from the conceptual representation of this sentence; an English example of the locative circumstance, for which the grammatical function of location is obligatory, is *The river runs along the coast*, while $*$*The river runs* is ungrammatical. However, we cannot assume that the verb *poyavit'sya* always functions as a locative circumstance. Consider other examples with this verb:

(10) *Posle registratsii u vas poyavitsya pravo na tehnicheskuyu podderzhku*
After registration with you-GEN appears right-NOM for technical support-ACC
Register now to have access to technical support

(11) *Pri etom ne poyavlyayutsya nikakie dialogovye okna, zvuki i t.p.*
Upon this-LOC not appear any dialog boxes-NOM, sounds-NOM, and so on.
In this case you should not see dialog boxes, hear sounds, etc.[2]

(12) *…svyaz' so znacheniyami, dlya vyrazheniya kotoryh oni poyavilis'.*
…relation to meanings, for expression-GEN which-GEN they-NOM appeared.
…relation to the meanings they have evolved to express.

These expressions show translation equivalents (*appear, have, see, evolve,* respectively). The grammatical configurations they are used in also differ, but the expressionsshow a certain unity of usage, which is captured by the traditional vocabulary definition for *poyavit'sya*: 'to come into existence or to become visible in the visual field'.

3. SEMIOTIC DELIVERY OF CONCEPTS. On the one hand, the above examples all suggest a greater influence of lexical information on grammatical choices than does the SFL position of 'lexis as most delicate grammar'. On the other hand, SFL is not a lexicalist approach, and this position is not a dogma, but another instance of its holistic attitude, namely the primacy of the whole with respect to its parts. SFL assumes that functions of constituents of a lower rank are determined by their contribution to meaning at the higher rank, while the whole is determined by the potential offered by its parts. A solution that satisfies this dialectics can be achieved by introducing a counterpart to the Upper Model—the Lexical Model (LM)—as a semantic resource for semiotic delivery of concepts from conceptual representations.

Other computational treatments of lexical semantics within SFL are not numerous. Teich et al (1994) describes processes of semanticization, i.e., assignment of UM-compatible grammatical functions to abstract language-independent concepts, on the basis of Kunze's theory of semantic emphasis: one test issue in their case is the dative shift: *Er schickt ihm eine Einladung* (He sent him an invitation) vs. *Er schickt eine Einladung an ihn* (He sent an invitation to him), but the study did not assume a model of lexical meanings *per se*. Stede (1998) describes lexicalization by means of a direct substitution of lexical items for specific configurations of CM concepts. This technique is effective in a restricted problem domain, but it leaves no place for the lexicon as a coherent resource of language, so it is not general enough to describe tuning of the existing lexical stock for semiotic delivery of concepts in a new register. Wanner's (1997) approach is close to the proposed LM; he also argues against 'lexis as most delicate grammar' approaches and treats lexis as an additional stratum between semantics and lexicogrammar. Unlike Wanner's approach, the proposed model assumes the LM and UM to be a joint meaning resource which is realized by joint lexicogrammatical means. Recent lexical studies in the framework of Mel'čuk's Meaning-Text model include the 'systemic lexicography' approach by Apresjan (1995), who takes another extreme by considering real-world knowledge as a part of the linguistic model, thus mixing language as a semiotic system and domain concepts as a system of representations. The LM approach seeks a middle ground between 'lexis as most delicate grammar' and 'conceptual lexicon' extremes.

According to the division into strata, meanings from an upper stratum are realized by means of resources available in the lower stratum, so UM and LM offer the joint meaning potential for realization of CM concepts and their configurations. Unlike the CM, which is aimed at a better representation of the problem domain (in this case, the design of a software system and operations possible with it), the LM and UM are organized in communication-oriented terms, so that they offer a resource which is general for all language-mediated communication (though with the possibility of variation across specific problem domains). In particular, the LM as a resource which points to concepts of the CM is not a replica of the CM or a lexical annotation for its concepts and their configurations. Rather, the LM marks a return to Saussure's negative description of a sign as an opposition, which distinguishes it from other signs. So realization of CM concepts through LM types is achieved by means of register-specific metaphorical hinting under context-sensitive conditions, which restricts the application range of signs (examples of LM types are given below). In the ideal terminological system, there should be a one-to-one mapping of words to concepts in the language-independent CM ontology, however, as evident from examples (5)–(11) above, this is not true even for carefully chosen and artificially designed problem domains like software. This discrepancy is caused by the difference between the semiotic LM (which, being semiotic, is based on oppositions and similes between concepts) and representation power, which is required from concepts of the CM.

The difference between the UM and LM as meaning resources follows from the difference between tasks of the grammar and lexicon: the latter is basically used for hinting concepts of a problem domain (including meanings of the interaction base, see below) and the former for structuring communication. Thus the grammar constitutes a closed set of functions, while the lexicon is potentially infinite. The difference between these tasks also means that the system of lexical meaning is to a larger degree dependent on register, while grammatical meanings are general for various domains in a language or even a set of languages, though they can be more frequent in some registers (cf. Halliday 1985:372). Yet LM and UM are not completely separate: classifications of the UM are inherited in the LM, while habitual usage patterns encoded by register-specific LM classes are related to corresponding grammatical structures encoded by UM classes.

Just as the relation between the conceptual stratum and semantics is that of realization, LM and UM resources are not defined as particular syntactic constructions and lexical items. Rather meanings that pertain to LM and UM are realized in the stratum of lexicogrammar by means of the systemic choice network[3]. Halliday (1985:30) distinguishes a system of classes, which are based on context-independent features of objects, from a system of functions, which are based on the meanings these objects receive in a communicative act. The first system is a classification of parts of speech, like nouns, adjectives and verbs, etc., while the second one contains such classes as Thing, Epithet, and Process, which are typically, but not necessarily realized by respective parts of speech. This notion of realization is close to Husserl's description of noemata, i.e. meanings as they are grasped in consciousness (Husserl 1952/1989). This view emphasizes that noemata are not attached to perceived objects, but are engendered in acts of 'passive synthesis' according to various contextual conditions[4]. In the Husserl-based view of language, speech production starts with meaning-intending acts which lead to the realization of meanings by physical signs that can be perceived by another interactant, whose passive synthesis results in meaning constitution, through which linguistic signs are endowed with meanings. Both meaning expression and meaning constitution are grounded in the intersubjective medium, which provides the potential for meaning exchange in the society (we will return to the notion of intersubjectivity in analysis of formation of terms in a register).

Once methodological preliminaries for the LM status are defined, we can proceed to explication of its content. One of the most important resources for the semiotic delivery of concepts by language is presented by such cryptotypes as 'container' or 'conduit' metaphors (Whorf 1956). In particular, in the problem domain of software, messages and data are treated as objects which contain information, e.g.:

(13) *Consult the manual for error messages*
Po povodu soobshchenij ob oshibkah obrashchajtes' k rukovodstvu pol'zovatelya
(14) *For more information, see the Troubleshooting section.*
Bolee podrobnye svedeniya mozhno najti v razdele 'Razreshenie voprosov'.
(15) *Additional messages cannot be stored*
Nevozmozhno sohranit' dopolnitel'nye soobshcheniya
(16) *...the information will be mailed to you by US Mail*
...dannye budut otpravleny vam obychnoj pochtoj

(13)–(14) use *message/soobshchenie* and *information/svedeniya* to refer to the content, while in (15)–(16) these words refer to its physical instantiation. The delivery of information pieces using the concept of 'container' leads to a metonymic transfer regular enough to be considered the LM type for English and Russian (as 'Standard Average European' languages, in Whorfian terms).

Some LM concepts are more specific for a problem domain, e.g., the concepts of searching and extraction for delivery of the CM concepts SELECT. Examples (2) and (3) present an important case for motivation of grammatical meanings of prepositional phrases. The slot source in the semantic specification of the English example is available in the LM concept extraction, while in Russian the same CM configuration is rendered with the LM concept searching.

Another feature which is reflected in this example is representation of dimensions in linguistic expressions; for example, two-dimensional objects in English are *screen, menu, panel, clipboard*, since, without additional contextual influence, they are used with the preposition *on*: *Position on menu, Double-click the Find Fast icon on the Control Panel, Put the selection on the clipboard,* etc. However, this feature should not be treated as physical dimensionality of such objects, because while Russian *panel'* (*panel*), *ekran* (*screen*) are still two-dimensional, see example (9), words *menyu* (*menu*) and *bufer* (*clipboard*) are treated as three-dimensional objects according to the Russian LM:

(17) *Polozhenie v menyu*
Position in menu

(18) *Pomestite vydelennyj fragment v bufer*
Put selected fragment-ACC in buffer
Put the selection on the clipboard

The CM concept FLYOUT is displayed on the screen as a small rectangle, which unfolds into a palette when pointed at with the mouse. In English, this concept is delivered by the LM concept for pull-down objects, thus the CM concept FLYOUT can be associated in English with such actions as clicking, dragging and extracting. However, the Russian expression for the CM concept refers to the result of mouse pointing: *palitra* (*palette*), which is rendered as a two-dimensional object.

Another case of dimension characteristics relevant for semiotic delivery is treatment of time intervals as spatial objects. According to Lakoff and Johnson (1980) there are several basic metaphors for time such as 'Time is a container' (*He did it in three minutes*) and 'Time is a landscape we move through' (*He didn't make it to Tuesday*), all of which are closely related to the spatial mental image of temporality. Spatial objects which represent time may have zero dimension, i.e. a point (*at*), one or two dimensions, i.e. a line or a plane (*on*) and three dimensions (*in, into*). Since dimensionality is related to grammatical configuration of a semantic specification (the configuration is realized by choices of respective prepositional phrases in the lexicogrammar), these features are present in the Upper Model, but possibilities for conceiving of palettes, screens, and days as two-dimensional objects are defined in the Lexical Model.

So far, our analysis concerned minor differences between the Lexical Models in English and Russian, however, examples *snap* and *poyavit'sya* suggest possibility of a radically different semanticization of a CM concept, if a target language lacks particular lexical items (cf. examples (5), (6) and (9)–(12)). Semanticization implied by *snap* in the register of software means an instantaneous event of abrupt movement into a new position. RHED (1992) describes this meaning of *snap* as 'to give way suddenly, as from strain' (A sudden movement is related to possibilities for issuing a sharp sound expressed in other meanings of *snap.*) The semiotic system of Russian lacks such a possibility, but it provides two options: to refer to this event while it happens (*prygnut', jump*), or to refer to its result, when an object resides in a location. Software manuals prefer the second option, since the purpose for a snap action consists not in a process of moving, but in setting a fixed point through which some line passes. The choice of the second option leaves us with two ways for semanticization of SNAP: using *privyazyvat'* (*attach*), as in example (5), or *prohodit'* (*pass*), as in example (6). The first semanticization is rendered by the LM concept of Binding, so example (5) expresses the fact that the drawing software holds the arc at the endpoint as the result of setting the point to snap to. Both the user, as the real Actor, and the software application itself, as the imagined Actor of this action[5], are usually 'taken out of brackets' in descriptions of software. Moreover, the LM concept of Binding inherits properties of the UM concept dispositive-material-action. This implies a process initiated by an Actor. Thus this semanticization is realized in the passive voice. On the other hand, the semanticization of SNAP which uses *prohodit'* (*pass*) is based on the UM concept of happening (thus leading to realization in the active voice. It is also based on the LM concept of moving, which implies a trajectory along which the Medium (the arc) runs.

In addition to the stratification of language, SFL assumes the organization of each stratum of the content plane in terms of three different types of meaning, which are referred to as metafunctions (Halliday 1985). All semantic resources of the LM presented above concern the ideational metafunction, as a resource for reflecting reality in language. However, lexical semantics can also encode also interpersonal and textual meanings. The resources of interpersonal meanings are less related to the semiotic delivery of CM concepts but are aimed at some influence upon the listener/reader. This involves lexical choice for the following:

- presenting one's ideas in lofty, neutral or informal style (the famous distinction here is between *perish, die* and *kick the bucket*);
- conformance to fashion or resistance to words which have recently come into fashion (thus presenting oneself as a modern or old-fashioned person);
- using neutral vs. slang words (this choice allows establishment of identity or difference within social groups to which the speaker and the listener/reader belong; in the case of technical texts, this is important for addressing two different types of communities: professionals and naïve users);
- evaluations which are inherent in ways for expression of CM concepts (for example, this involves expression of desirable vs. undesirable, appraisal vs. belittling, emphasizing vs. de-emphasizing importance, etc).

Since notions should be accommodated to the linguistic context in the deployment of texts, words for their expression follow requirements imposed by narrative cohesion, most notably those involved in the realization of referring nominal groups such as: the complete realization of a concept: *the Multiline Styles dialog box*; a generic realization: *the dialog box*; a shortened generic realization: *the box*; a synonymic expression (to reduce tediousness in the text): *the information panel*; an anaphoric realization: *it*. One particular case of interrelations between grammatical and lexical choices is taken from the instruction on A310 planes in English and Russian:

(19) *Fasten seat belt while seated*
(20) *Ostavajtes' pristegnutymi vo vremya poleta*
Remain-IMPF fastened-NOUN in time flight-GEN
Keep yourself fastened during flight

The English and Russian sentences here express different viewpoints on the requirement due to some lexical and grammatical restrictions. The English minor clause '*while seated*' corresponds simultaneously to the Russian verb *ostavat'sya* 'remain' with its imperfective aspect and to the condition on the action of fastening: *vo vremya* *poleta* (during flight). The Russian version conflates the person addressed in this instruction and his/her state: *pristegnutyj* 'fastened', which is not expressed English. However, the Russian sentence lacks a reference to the device for being fastened: *seat belt*. The Russian term for this device also exists: *privyaznye remni* 'fastening belts', but it is probably too long for the sign. An interesting semanticization feature for this concept is that the English term *seat belt* refers to a single device, albeit comprising two parts, while the Russian term uses the plural number to refer to it as two separate devices which connect in order to provide this function.

For the practice of generation, meanings of the CM are considered as absolutely independent from language and communication. However, in real life its concepts are created by means of language and, then, knowledge transfer is re-produced in educational activity through language. The creation of concepts, especially in a domain subjected to recent rapid developments such as computer software, is, to a large degree, based on metaphors which extend everyday usage of traditional words to denote new concepts. As discussed in Sharoff and Sokolova (1996), the register of software uses such metaphors extremely actively (e.g., *editor, 'drag and drop', folder, mouse, window*) in contrast to the use of complex neologisms borrowed or created from Greek and Latin elements, which are normal in other registers of science and technology[6]. Although the register of software is mostly monolingual in its origin (most inventions were first introduced in the English-speaking community), the same trend is valid in other languages (at least in French, German and Russian) in which official manuals prefer metaphoric translation equivalents for English terms.

An interesting example in this respect is the development of terms for a repository in which data are located. The first such term is *directory*, which was widely used in Unix and later imported into MS-DOS and early versions of MS-Windows. The initial metaphor implied by *directory* is of an index, a list of pointers into a proper repository of data. This corresponds closely to the actual design of directories of a file system as indices which provide access to files, while the real position of files on the hard disk is not necessarily related to the directory that lists them. Development of this register and the growing number of naïve users called for more user-oriented metaphors, which are not so closely related to the obscure connotations of the word *directory*—initially the Macintosh OS and then MS-Windows replaced *directory* with the term *folder*, which basically suggests just a location for information stored in data files. The term *file* is itself a metaphor for a binder of sheets, however, it represents more uniform treatment of data with respect to the content of these sheets: data in a file are related as a single unit or a consistent record, while the folder metaphor does not require consistency of content.

Since the potential for the delivery of concepts through language is constructed intersubjectively (i.e., meanings are constituted in a community of users) an incidental usage which emerges in a register may override general rules of the LM. This happens particularly often in the register of software with its monolingual origin, so software terms in other languages follow patterns of usage imposed by English. For example, the meaning of the Russian verb *podderzhivat'*, which is a translation equivalent of the English verb *support,* was reshaped in this register. Its general meaning corresponds well to such senses of *support* as 'bear, strengthen, help, finance'. However, the English phrase *to support a software* has induced the new usage pattern in Russian: *podderzhivat' programmnoe obespechenie* (in standard Russian this would mean roughly 'to protect software against a physical fall or money shortage').

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[1] Henceforth CM concepts are denoted in SMALL CAPS.

[2] The Russian *появится* (poyavitsya) can be applied to both vision and sound, while, in English, *dialog boxes* and *sounds* require *see* and *hear* respectively; cf. examples (7) and (8) for generic possibilities of the English *choose* in contrast to the Russian *выбрать* (vybrat').

[3] A detailed description of realization of semantic specifications by the systemic choice network is given in Matthiessen and Bateman 1992.

[4] Cf. McIntyre and Smith 1982 for a discussion of relationship between Husserl's noemata and linguistic meanings.

[5] A tool which performs some function is regularly considered a doer of actions caused by this function.

[6] This happens not only in the register of software. The same trend is valid also in other most recent research areas, in particular, in genetic engineering, in which, for example, a gene that terminates activity of nucleus in a cell is called '*reaper*'. This trend might be related to the recent preference for informal settings in expression of ideas (also found in registers of political and economical discourse).

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SEMANTIC VARIATION IN NONSTANDARD FORMS OF THE LEXICON: A COGNITIVE LINGUISTIC CASE STUDY

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This paper is an attempt to trace the avenues of semantic extension in nonstandard forms of the Serbo-Croatian lexicon and to propose a general model of lexicographic treatment for such polysemic nonstandard lexical entries.

The aim of the research behind the paper is twofold. First, it is meant to be a testing ground for cognitive-linguistic approaches to semantic variation (see Langacker 1991, Lakoff & Johnson 1999). Second, it is intended to be a metalexicographic contribution to the treatment of the dictionary microstructure in dictionary projects involving nonstandard forms of language.

The methodological framework for the analysis can be described as cross-cultural cognitive linguistics. The following claims are of particular importance:

1. The idea that 'The conventional meaning of a lexical item must be equated with the entire network, not with any single node' (Langacker 1991:3),
2. The binary (phonological-semantic) model of symbolic units, as presented in Langacker (1991),
3. The role of metaphor in language, as presented in Lakoff and Johnson (1999), and earlier in Lakoff and Johnson (1980),
4. The idea that 'in natural language meaning consists in human interpretation of the world. It is subjective, it is anthropocentric, it reflects predominant cultural concerns and culture-specific modes of social interaction as much as any objective features of the world "as such"' (Wierzbicka 1988:2, reiterated in Wierzbicka 1992, and previously elaborated in Whorf 1956).

1. serbo-croatian–english colloquial dictionary. On the empirical level, this research is a case study of nonstandard Serbo-Croatian. The materials used are derived from the *Serbo-Croatian–English Colloquial Dictionary* Project, which comprises aproximately 24,000 entries. I will therefore first present the sketch of lexicographic policies in this project and problems encountered in it.

The notion of colloquialness is an elusive one. It is an example of what Lipka (1992) calls a 'notational term', the definition of which depends not only on content, but also on the approach used. The description of colloquial lexicon as used in this dictionary project is shown in Figure 1 (overleaf).

For our purposes 'colloquial' in this dictionary project included:

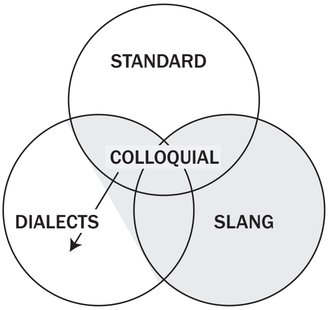


Figure 1. Description of *colloquial.*

1. slang words, i.e., nonstandard lexemes peculiar to social and professional groups,
2. words that belong to the standard language, but are more part of spoken style than written style,
3. words from dialects, if they are known and used over a sufficiently wide area so that an outsider might actually encounter them (not just in a few villages). All these components are, thus, informal and spoken.

The following two quotations from AHD (1992:s.v.) express other possible terms which can be used to refer to this field or its subfields.

> **nonstandard** […] ***Usage Note***: The term *nonstandard* was introduced by linguists and lexicographers to describe usages and language varieties that had previously been labeled with terms such as *vulgar* and *illiterate*. *Nonstandard* is not simply a euphemism but reflects the empirical discovery that the varieties used by low-prestige groups have rich and systematic grammatical structures and that their stigmatization more often reflects a judgment about their speakers rather than any inherent deficiencies in logic or expressive power. Note, however, that the use of nonstandard forms is not necessarily restricted to the communities with which they are associated in the public mind. Many educated speakers freely use forms such as *can't hardly* or *ain't I* to set a popular or informal tone. Some dictionaries use the term *substandard* to describe forms, such as *ain't*, associated with uneducated speech, while reserving *nonstandard* for forms such as *irregardless*, which are common in writing but are still regarded by many as uneducated. But *substandard* is itself susceptible of disparaging interpretation, and most linguists and lexicographers now use only *nonstandard*, the practice followed in this dictionary.

> **dialect** […] ***Synonyms***: *dialect, vernacular, jargon, cant, argot, lingo, patois*. These nouns denote forms of language that vary from the standard. *Dialect*

> applies to the vocabulary, grammar, and pronunciation characteristic of a specific geographic area or locality. The *vernacular* is the everyday language spoken by a people as distinguished from the literary language. *Jargon* is the specialized language used by a social or occupational group but not understood by the general public. *Cant* now usually refers to the specialized vocabulary of a group or trade and is often marked by the use of stock phrases. *Argot* applies especially to the language of the underworld or, by extension, to that of any specific group. *Lingo* is applied, often humorously or contemptuously, to language that is unfamiliar or so specialized that it is difficult to understand. *Patois* refers especially to a regional dialect without a literary tradition or to a creole.

The field of *colloquial* is also internally elusive. Even if we succeed in determining its boundaries we still have to address the following four problems in the semantic structures of its lexical items:

a. no corpus can capture the whole range of generality in many particular meanings,
b. no corpus will register all existing metaphorical extensions (and predict new ones),
c. some semantic extensions assume the knowledge specific to phonetic structures of the given language,
d. ample semantic extensions assume the knowledge specific to the given culture and its subcultures.

Only the problems concerning semantic structures have been listed above. Similar problems are encountered in the phonological side of semantic units. Thus, for example, the form of any lexeme can be altered by moving the first syllable to the ultimate position, which makes it virtually impossible for a dictionary to be comprehensive in its main body.

The statistics based on the second draft of the dictionary shows that the treatment of semantic extensions is indeed the central task of this project. Semantic extensions have been identified in 66 % of senses in this dictionary.

The scope of the project and the difficulties mentioned required a specific approach to nonstandard semantic extensions, which will now be discussed.

2. NONSTANDARD SEMANTIC EXTENSIONS—PRELIMINARIES. If we go back to our Figure 1, we can claim that relations between standard and colloquial lexemes are not merely ones of neighboring and exclusion. Many nonstandard lexemes assume the existence of the standard ones and vice versa. These pairs of lexemes are presented in Table 1 using the previously mentioned cognitive-linguistic binary model of symbolic units.

Level	Standard		Nonstandard	
	Phonological	**Semantic**	**Phonological**	**Semantic**
1.	*s(j)ekira*	axe	*sikira*	axe
2.	*kuća*	house	*ćaku*	house
3.	*l(j)etovalište*	summer vacation resort	*l(j)etovalište*	prison
4.	*zujati*	buzz	*zujati*	have fun

Table 1. Standard and nonstandard lexemes in Serbo-Croatian.

Semantic extension Type A	 Type B
1. internal nonstandard	standard-nonstandard
2. internal semantic	phonetic-semantic
3. culture-bound	more general

Table 2. Types of semantic extensions in Serbo-Croatian.

In examples [1] and [2] in Table 1 nonstandard lexemes have identical semantic units with their standard counterparts while their phonological units differ. In examples [3] and [4], on the other hand, phonological units are identical and the semantic ones transformed. In both cases there is a clear link between nonstandard lexemes and their standard counterparts.

Examples like [3] and [4] are the primary interest of this paper. In both cases there is a semantic extension linking standard and nonstandard meaning. Thus, [3] uses an ironic statement 'prison is like a summer vacation resort', and [4] links its meanings by direct analogy between having fun and buzzing—'having fun is like buzzing around'.

Obviously, these two examples of semantic extensions are just Weberian ideal types. Semantic structures in the colloquial dictionary project mentioned, and in this field in general, are obviously much more intricate.

The semantic extensions identified in the project point to the three relevant distinctions presented in Table 2, and explained in turn. The first category in Table 2 points to the fact that a nonstandard semantic extension can have its source domain in nonstandard or in standard lexicon. The first type of extension can be seen in *drkati* 'obscene for: to masturbate' with its destination domain 'fiddle with, touch or play with without any reason or purpose' (both meanings are nonstandard) or *eki* 'pragmatic operator used to express surprise' and 'question tag' (both meanings are nonstandard). The second situation can be illustrated by: *devojka* 'young female' (standard) and 'prostitute' (nonstandard) or standard *taster* 'key (e.g., on a keyboard)' and nonstandard 'informer'.

The first value in the second category in Table 2 has been thoroughly elaborated in numerous studies. We have, for example, the metaphor 'a remote place is like a

	Lexeme	Source domain	Link	Target domain
1.	*krmak*	'boar' (the animal)	non-Muslim is like a boar	'non-Muslim'
2.	*leš*	'corpse'	senior citizen is already a corpse	'senior citizen'
3.	*pop*	'priest'	homosexual is like a priest	'homosexual'
			(no wife)	
4.	*pička*	'vagina'	what matters to man about a girl is her vagina	'girl'

Table 3. Culture-specific extensions in colloquial Serbo-Croatian.

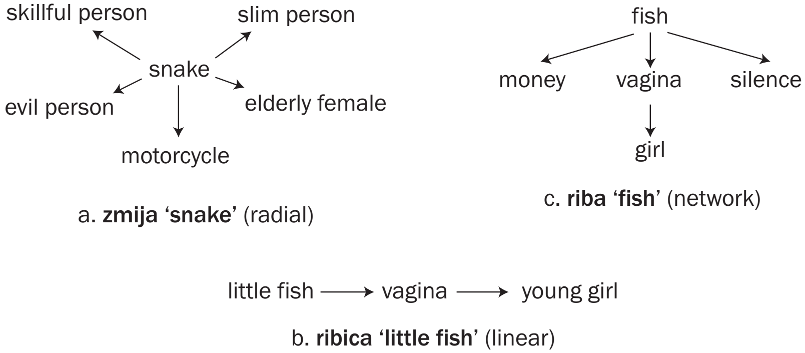
hole' in an internal semantic extension *rupa* 'hole' → 'remote place, hellhole' or 'redheads look like carrots' which is behind the extension *mrkva* 'carrot' → 'redhead'. The second value is seldom mentioned in the literature. This concept covers the situations where the partial similarity of forms triggers semantic extension. Thus, nonstandard Serbo-Croatian has a series of lexemes to denote a homosexual with the following source domains: *pedala* 'pedal', *pedikir* 'pedicure', *pešak* 'pedestrian', *peškir* 'towel', *Peđa* 'proper name', *Pežo* 'Peugeot, a car brand'. The only link between these meanings and 'male homosexual' is that they are phonologically similar to *peder*, the most common nonstandard word for a male homosexual.

Finally, the extension can be culture-bound or more general. Table 3 provides several examples of culture-bound metaphoric extensions. Example [1] is determined by one's religious/ethnic affiliation (i.e., Bosnian Muslim) and certain religious practices (i.e., their diet excludes pork). [2] is determined by one's inclusion in an age group, [3] by the Catholic religion (i.e., celibacy is compulsory for Catholic priests), and finally (hetero)sexuality and physiology is the basis for [4]. These lexemes in their extended senses have been used within their (sub)cultures with a certain connotative value, such as offensive, as in: *Ne mogu tog krmka na oči!* ' I cannot even look at that boar/non-Muslim' or facetious , as in: *On je pop pa ga zato ne zanimaju pičke* 'He's a priest/homosexual and that's why he is not interested in vaginas/girls'.

On the other hand: *rasturiti* 'destroy' → 'win' or *plakati* 'cry' → 'complain' have much wider cross-cultural distribution for the simple fact that they are based on certain (almost) universal cognitive and affective faculties of the human species.

The (sub)cultural webs which determine any particular semantic extension can be very intricate and non-apparent for the individuals outside that given (sub)cultural milieu. The lexeme *fataljist* 'person who cleans parks', for example, is determined by the following linguistic facts:

a. the existence of a substandard verb *fatati* 'to catch',
b. the existence of the noun *list* 'leaf',
c. the existence of a sterotype that an Albanian accent turns *l* into *lj*, which changes *list* into *ljist*,



a. **zmija 'snake'** (radial)

c. **riba 'fish'** (network)

b. **ribica 'little fish'** (linear)

Figure 2. Weberian ideal types of semantic structures as represented in colloquial Serbo-Croatian.

d. the existence of the noun *fatalist* 'fatalist'.

On the other hand, there is a common perception that Albanians have performed such jobs in the former Yugoslavia. The lexeme *fatalist* is changed into 'Albanian' *fataljist*, re-segmented into *fata-ljist* 'catches leaves', but still remains present (i.e., person with that social-economic status is perceived as a fatalist). The corpus of this project contains numerous examples with such intricate networks.

One should say that the limits of understanding do not necessarily go along the lines of (sub)cultures. Thus the network behind the lexeme *folksvagina* 'prostitute' includes the existence of an automobile *Volkswagen*, Serbo-Croatian noun *vagina* 'vagina' and German prefixoid *Volks-* 'people's'. A prostitute is thus 'people's vagina'. This semantic extension will be understood depending on one's knowledge of the mentioned German lexical item and it does not depend solely on one's (sub)cultural background.

Three distinctions mentioned in Table 2 have direct and far-reaching consequences for lexicographic treatment in this dictionary. Standard-nonstandard semantic extensions thus require that the source domain from the standard language is identified; phonetic-semantic extensions require additional explanations of how phonetic similarity has triggered a semantic extension; while culture-bound extensions require ample explanations about their cultural background. This adds to the problems mentioned at the beginning and creates a morass for any lexicographer. However, not all of them are cognitively relevant to contemporary native speakers.

However, some patterns of regularity can be identified within semantic extensions. The material from our project shows further that there are three typical organizations of semantic structures, again understood as Weberian ideal types, *radial*, *linear* and *network*, as shown in Figure 2. In Figure 2(a) the lexeme *zmija* in its meaning 'snake' is the source for all other extensions (i.e., a skillful person will get through everything just like a snake, a slim person looks like a snake, etc.). All metaphoric extensions spread radially from this source. The case where there are only two meanings (i.e., the case of branching) can be viewed as a special case of the radial category. In Figure 2(b), on the other hand, semantic structure develops in the linear manner (from *ribica* 'small fish') first develops 'vagina' (it is slimy like a small fish) and from this meaning develops 'girl' (who has a vagina). Finally, in Figure 2(c) there are elements of both previously mentioned principles. From *riba* 'fish' we have radial development into 'money' (i.e., one can have as much money as fish, one can 'fish it'), 'silence' (i.e., the fish is mute), and finally 'vagina' (i.e., being slimy). At the same time there is a linear development fish → vagina → girl, just like in the example from Figure 2(b).

Each of these three models can have its standard-nonstandard version, where the source meaning belongs to the standard lexicon, and internal nonstandard version, where both meanings belong to the nonstandard lexicon. If we compare the following two examples we can see that both standard-nonstandard, (1), and internal nonstandard, (2), situations (nonstandard meanings are in **bold** face):

(1) RIBICA: little fish → **vagina** → **little girl**
(2) KEFALO: **head** → **mind** → **smart person**

3. DISCUSSION AND TENTATIVE SOLUTIONS TO THE PROBLEMS. The results of this research demonstrate the usefulness of the cognitive-linguistic approach to semantic variation and point to the culture-specific features of these extensions, which in turn contribute to the cross-cultural linguistics approaches as represented in Pike (1996) and Wierzbicka (1994).

The three distinctions from Table 3 have the following consequences for the treatment of the lexicon in any theoretical approach:

a. First, we must recognize that the nonstandard sphere of the lexicon assumes the existence of the standard one. It is because in numerous cases semantic extensions spread from standard to nonstandard, and cases which go in the opposite directions are just marginal exceptions. Any model of the lexicon should therefore recognize that nonstandard is not only the sphere which is outside of standard, but it is also dependent on it.
b. Second, the role of the phonological form in semantic extension must be taken into account. Numerous examples from the corpus where the mere similarity of two lexemes triggers the establishment of a semantic link between them shows the importance of phonological form.
c. Finally, any model of the lexicon should include a wider network of knowledge about the given culture and its subcultures. In the corpus there is ample evidence of semantic extensions being (sub)culture-bound.

The difficulty in identifying all uses within one general meaning points to the need to understand semantic structures widely and to allow fuzzy edges and areas of overlap.

Given all this, we can return to the aforementioned problems:

a. no corpus can capture the whole range of generality in many particular meanings,
b. no corpus will register all existing metaphorical extensions (and predict new ones),
c. some semantic extensions assume the knowledge specific to the phonetic structures of the given language,
d. ample semantic extensions assume the knowledge specific to the given culture and its subcultures.

and offer the following general metalexicographic policies as their solution:

1. Semantic variation should be represented dynamically, it should take into account the dynamism of semantic extensions (This will be discussed in detail later in this paper.),
2. The definition of any particular meaning should be very general. For example, numerous lexical nonstandard items denoting a person considered to have limited cognitive abilities are all assigned a very broad English definition: a mentally deficient person and the equivalent *moron* (still differentiating it from an insane individual, a *nutcase*). Thus one can be certain that even those instances of generality which are not found in the corpus are covered by the definition.
3. It is necessary to introduce, in definitions and elsewhere, the means which surmount the cultural differences between the content of the dictionary and its users. For example, the entry *Varburđini* has to be explained as a clipping from *Wartburg*, a simple Eastern European car and *Lamborgini*, a sophisticated Western European car, which has facetious perlocutional force when used to denote a Wartburg. The means intended to surmount cultural differences are not limited to dictionary text per se. The introductory text is very important in this respect, where certain claims about the (sub)culture in question can be supported by quantitative data. For example, the claim that nonstandard Serbo-Croatian is male-centered can be supported by the fact that there are over fifty extensions based on the claim 'female is equal to her vagina' (and only several extensions based on the claim 'male is equal to his penis' with a proportional difference in their distribution), as well as more than one hundred based on the claim 'sexual intercourse is an act of violence with female in the role of the patient' (with no extensions whatsoever with a male in the role of the patient).

While solutions two and three are well known and widely applied, the first solution requires some additional elaboration.

	Relation type	
Level	coordination	subordination
1	1., 2., 3…	a., b., c…
2	i., ii., iii…	aa., bb., cc…
3	x., xx., xxx…	aaa., bbb., ccc…

Table 4. Notations for relations in semantic extension and levels.

In order to represent the dynamism of semantic extensions in the dictionary, the following notation has been used to represent coordination (i.e., two or more meanings represent independent extensions from one or more source domains) and subordination (i.e., one meaning is an extension from another):

If we take a look at (3), *muf* 'fur', the source meaning of which belongs to the standard lexicon, three relations of subordination can be identified:

(3) *muf* 'fur'
↓
a. 'pubic hairs' (pubic hairs look and feel like fur)
↓
b. 'vagina' (vagina is where pubic hairs are)
↓
c. 'girl' (what matters on a girl is her vagina)

whereas in (4), *fordaljka*, the source meaning of which is in the network of knowledge, the two meanings are coordinated.

(4) *fordaljka*
↙ ↘
1. 'old automobile' 2. 'very difficult problem'

Both meanings are derived from a cult comic book *Alan Ford*, but the first has to do with an old automobile owned by one of the characters and the second with a crossword puzzle on the cover of this comic book. This example also shows us that source meaning does not have to be explicit.

It is a matter of course that these two relations can be combined, as they are in (5):

(5) *leš* 'corpse'
↙ ↘
1. a. 'elderly individual' 2. a. 'elderly prostitute'
↓ ↓
b. 'parent' b. 'prostitute'
↓ ↓
c. 'father' c. 'female'

with the following extensions:

An elderly individual is already a corpse (0 → 1a)
A parent is an elderly individual (1a → 1b)
A father is a parent (1b → 1c)
An elderly prostitute is as ugly as a corpse (0 → 2a)
An elderly prostitute is a kind of prostitute (2a → 2b)
Females are prostitutes (2b → 2c)

This treatment of polysemy is capable of mirroring the three basic models of semantic extensions (radial, linear, and network), that is, an integrated relational network storage of a human's linguistic structure. At the same time, the user of the dictionary is, so to speak, alerted to recognize the extensions, which will enable her to predict the extensions which cannot be found in the dictionary. In presenting items with semantic extensions source senses precede their metaphorical extensions despite frequency. This strategy was recently advocated by Van der Meer (1999).

4. PROBLEMS WITH THE SOLUTIONS. The treatment of polysemy, which tends to trace the avenues of semantic extension is not uncontroversial. At least the following challenges to it can be mentioned.

1. It still fails to encompass all links within the polysemic structure, notably the less prominent ones. If we look at the example *leš* 'corpse' above, we notice that the link between 'elderly individual' and 'elderly prostitute' has not been captured.

The answer to this challenge is a very simple one. This treatment is the closest one can get given that the user of the dictionary most likely has limited cognitive faculties and any information overburdening can result into interference in the communication channel between the dictionary and its user.

2. It is still rather subjective, both in the sense that different speakers might not agree if a semantic extension is a legitimate one or not, and that there are few means of objective testing and verification of these links. This is particularly true when we have to determine what is the source and what the target domain of the extension.

There are two possible answers to this challenge. One can first argue that, as in any other lexicographic work, it is important that all identical and similar cases be treated equally. Thus one established metaphorical extension may not be shared by all native speakers. However, if the compiler of a dictionary records the extension consistently in all lexical entries where it appears, the dictionary in question will not be devalued. The second possible answer is that, even though the means of testing and verifying are not simple and easy to find, they still exist, ranging from the fact that something just 'makes sense' to the situations where one can use evidence from another language. For example, the linear extension *biser* 'pearl' (an excellent idea is like a pearl) → 'excellent idea' (irony: a stupid idea is an excellent idea) → 'stupid idea' simply makes 'more sense' than any other possible sequence, whereas in the entry *fajercajg* 'lighter' → 'face', this sequence can be supported by the fact that the lexical item *Feuerzeug* in German, the source of this lexical item, has the first and not the second meaning.

Further research should be directed toward establishing more formal criteria for testing and verifying the extensions represented in lexicographic projects.

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DIRECTIONALS VERSUS ASSOCIATED MOTIONS IN CAVINEÑA

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THIS PAPER IS AN ATTEMPT TO ANALYZE[1] some verbal inflections having to do with notions of motion in Cavineña, an Amazonian language of the Takanan family, spoken in northern Bolivia.

The study is based on a corpus of 23 texts that I personally collected and transcribed from three different native speakers (four months of fieldwork in summer 1997 and summer 1998).

Cavineña is a highly agglutinative language in terms of its verbal morphology. Among the many possible inflections a verb can take, many have to do with notions of motion. An example of a verb inflected with motion morphemes is given in (1)[2]:

(1) *tudya ike taraka-ju bade-**tsura-diru**-kware*
then 1SING.ABS coral-LOC perch-**upward-while.going.back**-PAST
'Then, I perched up on the corral while I was going back.'

In the data, I found a total of thirteen different motion inflections. The purpose of this paper is an attempt at analyzing seven of them[3]. The seven inflections are given in Table 1 (overleaf). I will give evidence that these seven motion inflections can be further subdivided into two sets: a first set labeled *associated motions* and a second set labeled *directionals*.

In order to better understand the discussion of motion inflections, I will first give basic information about the morpho-syntactic structure of Cavineña.

1. GENERAL MORPHO-SYNTACTIC FACTS ABOUT CAVINEÑA. Cavineña is an ergative language. The ergative argument is case-marked by the morpheme *-ra*. The absolutive argument is unmarked. There are no cross-referencing affixes or clitics in the verb. As an illustration, consider the following pair of examples, the first one transitive, the second intransitive:

(2) *Roberto etare-ju judiru-kware* (intransitive)
Roberto.ABS house-LOC arrive-PAST
'Roberto arrived at the house.'

(3) *Roberto-**ra** Rosa riwi-**sha-jeri-nuka-kware*** (transitive)
Roberto-**ERG** Rosa.ABS fall-**CAUS-almost-iterative-PAST**
'Roberto almost made Rosa fall again.'

-tsura	‘upward’
-bute	‘downward’
-ti	‘go and do’ [4]
-na	‘come and do’
-nati	‘do while going’
-diru	‘do while going back’
-eti	‘do while coming back’

Table 1. Cavineña set of motion inflections.

Set 1: Directionals		Set 2: Associated motions	
-tsura	‘upward’	*-ti*	‘go and do’
-bute	‘downward’	*-na*	‘come and do’
		-nati	‘do while going’
		-diru	‘do while going back’
		-eti	‘do while coming back’

Table 2. Directionals and associated motions in Cavineña.

Word order is flexible but SOV seems the unmarked order as in the example (3). Also Cavineña has further features often associated with SOV languages such as postpositions, possessor-possessed order, verb-auxiliary order, as well as a propensity to suffixation as opposed to prefixation.

Finally, a finite verb in Cavineña minimally consists of the root followed by a tense suffix as in (2). Potentially, other suffixes—including the motion inflections to be discussed—can attach to the root which yields highly agglutinative verbs. This is seen in examples (1) and (3) above. These examples also show another characteristic of the Cavineña verb, namely that the tense suffix always occurs in the last position.

2. distribution of motion inflections. Based on their distribution inside the verb, the motion inflections can be split into two subsets as in Table 2. The distribution is as follows. First, inflections inside one set are mutually exclusive, that is, they never co-occur. On the other hand, an inflection from one set can co-occur with an inflection of the other set. Finally, in the case of co-occurrence, the order is fixed, namely inflections from set 1 obligatorily precede inflections from set 2.

The following example illustrates these observations:

(4) *tudya ike taraka-ju*
then 1sing.abs coral-loc
*bade-**tsura-diru**-kware*
perched-**upward**(dir)-**while.going.back**(assoc.motion)-past
‘Then, I perched up on the corral while I was going back.’

Thus we can observe that -*tsura* 'upward', an inflection from Set 1 *co-occurs with and precedes* -*diru* 'do while going back' which is an inflection from Set 2.

In the following, I will present further characteristics of each set, first the set of associated motions, second the set of directionals.

3. CAVINEÑA ASSOCIATED MOTIONS. The term *associated motions* comes from descriptions of Australian languages which have highly elaborated systems of this category (Koch 1984, Tunbridge 1988, Wilkins 1991).

As the term indicates, associated motion inflections *associate* the verb stem event with an event of motion. Thus in (5) the verb *ba* 'see' is associated with the motion event -*diru* 'going back'.

(5)	*senda-ju*	*ba-**diru**-kware*	*beta*	*dati*
	path-LOC	see-**while.going.back**-PAST	two	tortoise.ABS

'I saw two tortoises in the path while I was going back[5].'

Associated motions always encode the motion of the *nominative* argument[6]. This is to say that, regardless of the transitivity of the verb stem, they always encode the motion of the subject argument[7]. As an illustration, consider (6) and (7)—in both cases the motion event encoded by -*diru* is the motion of the subject argument, namely 'he' in (6) and 'I' in (7) (but not the object 'it' in the latter example).

(6)	*tuja*	*ekari-ju*	*kwinana-**diru**-kware*	(intransitive)
	his	path-LOC	go.out-**while.going.back**-PAST	

'He went out of his path **while he was going back.**'

(7)	*era*	*amena*	*etare*	*japadama*	*ijewe-**diru**-kware*	(transitive)
	1SING.ERG	then	house	close	throw-**while.going.back**-PAST	

'I threw it (a crocodile) close to the house **while I was going back.**'

Another property of associated motions is to encode some temporal relation distinctions between the verb stem event and the motion event. The preceding examples (5), (6) and (7) encode *concurrent* motion, which means that the verb stem event and the motion event are simultaneous. In addition to the inflection -*diru* 'going back', the set of concurrent associated motion also includes -*nati* 'going' and -*eti* 'coming back'.

On the other hand, two inflections, -*ti* and -*na*, encode *prior* motion, which means that the event of motion precedes the verb stem event in time[8]. As an illustration, consider (8):

(8)	*rewa*	***yatse***	*espere-ju*	*kutsa-**ti**-chine*	(prior motion)
	here	**1DUAL.ABS**	creek-LOC	bathe-**go.and.do**-PAST	

'Here (on the picture), we two **went and** bathed in the creek.'

CONCURRENT MOTION		PRIOR MOTION	
-nati	‘do while going’	*-ti*	‘go and do’
-diru	‘do while going back’	*-na*	‘come and do’
-eti	‘do while coming back’		

Table 3. Associated motions in Cavineña.

	‘GOING’ FORMS (away from speaker)	‘COMING’ FORMS (toward speaker)
‘straight’ forms	*-nati* ‘do while going’ *-ti* ‘go and do’	*-na* ‘come and do’
‘return’ forms	*-diru* ‘do while going back’	*-eti* ‘do while coming back’

Table 4. Cavineña basic deictic motion verbs.

The three concurrent associated motions and the two prior associated motions are summarized in Table 3.

Finally, associated motions encode notions of path/trajectory[9]. First, they encode deictic information. Thus there are ‘going’ versus ‘coming’ forms. ‘Going’ forms include *-nati* ‘do while going’, *-diru* ‘do while going back’ and *-ti* ‘go and do’ and encode motion *away from the speaker*. In opposition, the ‘coming’ forms, namely *-eti* ‘do while coming back’ and *-na* ‘come and do’ encode motion *toward the speaker*. Another path/trajectory distinction encoded by the associated motions is the notion of ‘returning’. ‘Returning’ associated motions include *-diru* ‘do while going back’ and *-eti* ‘do while coming back’ as opposed to ‘non returning’ or ‘straight’ motion associated motions as for *-nati* ‘do while going’, *-ti* ‘go and do’ and *-na* ‘come and do’[10]. These distinctions are summarized in Table 4.

4. CAVINEÑA DIRECTIONALS. The term *directionals* comes from descriptions of Mayan languages (Robertson 1980, Haviland 1991, 1993, Craig 1994, Zavala 1994) and Papua New Guinea languages (Foley 1986) which have extensive systems of this type of category.

Similarly to associated motions, Cavineña directionals also encode path/trajectory, namely the upward/downward opposition[11]. Thus, consider the following example showing the upward trajectory:

(9)	*ukeda*	*ba-tsu-tu*	*juye*	*chamakama*	*neti-**tsura**-chine*
	hot	feel-and-CLIT	OX.**ABS**	finally	stand-**upward**-PAST

‘The ox felt hot and finally stood up.’

As stated in the preceding section, associated motions encode the motion of the *nominative* argument. However, this is not the case for directionals which encode the motion of the *absolutive* argument[12]. Thus, in the case of a transitive verb

	5 ASSOCIATED MOTIONS		2 DIRECTIONALS
MOVING FIGURE	nominative argument		absolutive argument
SEMANTICS	trajectory		
	motion		no motion (?)
	3 concurrent	2 prior	

Table 5. Summary of verbal motion inflections in Cavineña.

inflecting with a directional, as for the verb *iya* 'put' and the directional -*tsura* as in (10), the upward trajectory is the trajectory of the object argument, namely 'the wild pig and the two tortoises', and not the subject argument 'I'.

(10) *tudya* *amena* *kwaba-ju* *iya-***tsura***-kware* *waburu* (trans)
hence then canoe-LOC put-**upward**-PAST wild.pig.ABS
beta *dati* *jadya*
two tortoise.ABS and
'Then, I put the wild pig and the two tortoises [**up**] in the canoe.'

Unlike associated motions, Cavineña directionals do not specify any temporal relation between the verb event and the motion event. Interestingly, descriptions of directionals in Mayan and Papua New Guinea languages do not report any kind of temporal relation specifications either. What is more, Craig (1994) argues that in Jakaltek, a Mayan language, directionals do not actually encode any motion whatsoever but only specify the path/trajectory. Possibly, Cavineña directionals, similarly to Jakaltek directionals, only encode path/trajectory but not motion.

Thus in (10) the directional -*tsura* is attached to a motion verb, *iya* 'put'. In other words, the motion element is already encoded by the lexical root and it is possible that the directional only brings path/trajectory specification but not motion.

5. CONCLUSION. In this study, I showed that Cavineña has five associated motions and two directionals. I first showed that both categories have distinct distributional properties—namely that they form two different paradigms and that each paradigm has its own slot in the verb. Then I discussed the fact that they both encode notions of motion, precisely the notion of path/trajectory. However I showed that they diverge on the argument on which their specification is applied, namely that associated motions specify the nominative argument whereas directionals specify the absolutive argument. Finally I discussed the fact that associated motions clearly encode motion but that directionals might not. Table 5 recapitulates the characteristics of each set.

I have thus shown, based on the analysis of seven verbal motion inflections, that Cavineña is a language with a highly sophisticated system of grammaticalized motion. Also, it is interesting to remind that Cavineña has actually more motion inflections than the one discussed in this paper[13], a fact which suggests that the overall system might be even more rich and complex.

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[1] I thank Roberto Zavala and Colette Grinevald for their suggestions in preparing this paper.

[2] Glosses are as follows:

ABS	absolutive case	LOC	locative
CAUS	causative	PAST	past tense
CLIT	clitic (function unclear)	1SING	1st person singular
ERG	ergative case	1DUAL	1st person dual

[3] The nature of the six remaining motion inflections is not clear enough for me at the present to include them in the discussion. Below is the list of these inflections with tentative glosses:

-aje	'do continuously while going'	*-tsa*	'do while going toward someone'
-etibe	'do continuously while coming back'	*-dadi*	'do while going behind someone'
-be	'do continuously while coming'	*-kena*	'do while leaving'

[4] In the glosses, *do* stands for the verb stem on which an inflection attaches to.

[5] The subject (1st person singular) is not overtly expressed in this example. This is another feature of Cavineña morpho-syntax that arguments need not be overtly expressed if the context can disambiguate. The same remark applies for some of the following examples. Thus the subject (3rd person singular) in (7), the object (3rd person singular) in (8) and the subject (1st person singular) in (10).

[6] By 'nominative argument' I mean the subject argument of an intransitive verb and the subject argument of a transitive verb, regardless of their case marking. As we saw in section one, Cavineña is an ergative language, and the two types of subjects do not receive the same marking: the first receives an absolutive marking whereas the second receives an ergative marking.

[7] Directionals on the other hand encode the motion of the *absolutive* argument as will be discussed below.

[8] Subsequent motion, where the motion event follows in time the verb stem event is not attested in Cavineña. However this distinction does indeed exist as it is found in some Australian languages (Tunbridge 1988, Wilkins 1991).

[9] I use the term *path* in the sense of Talmy (1984) which decomposes any motion event into the following elements: figure, motion, path, ground and manner. Other authors such as Craig (1994) also use the term *trajectory* to refer to the same notion.

[10] Further possible notions encoded in associated motions are illustrated in some Australian languages: path/trajectory notions such as upward/downward and past a point and manner notions such as the speed of the motion.

[11] Further path/trajectory distinctions are found in Mayan languages. For example, Jakaltek has the following inventory of directionals (Craig 1994):

-toj	'away from'	*-(e/i)l*	'out'
-tij	'toward'	*-(e/i)k*	'passing, through'
-(a)h	'up'	*-pax*	'back, again'

-(a)y	‘down’	*-kan*	‘remaining, still’
-(o/e/i)	‘in’	*-kanh*	‘up, suddenly’

[12] Again, I remind the reader that the notions of 'nominative' versus 'absolutive' arguments used in our discussion of motion inflections are not to be confused with the marking of the grammatical functions which are those of an ergative language, as we described in section 1.

[13] See footnote 3.

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THE ROLE OF HANDSHAPE IN ASL VERBS

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Problems continue to surface regarding not only the phonological makeup of ASL, but also regarding the phonemic or morphemic status of particular members of the sets of 'parameters' or categories of handshape, location, movement, and perhaps palm orientation. Stokoe, Casterline and Croneberg (1965) first identified three such sets, which they called 'aspects' consisting of 19 handshape, 12 location and 24 movements. Renamed 'parameters' rather than 'aspects' by Klima and Bellugi (1979), these sets were reorganized, and the category of palm orientation was added, based on the identification of minimal pairs of signs in which only the orientation of the palm differed. Thereafter, these sets of parameters have been assumed to be phonemic.

Various attempts at a description of the set of sublexical units of ASL signs have been vigorous. One such description is the Hold-Movement model of Liddell (1984) and Liddell and Johnson (1989), which divides the sign into Hold and Move segments, with each segment defined in terms of sets of features. Other descriptions attempt to capture the spatial component of signs through feature geometry, one of the most recent of which is that of Uyechi (1996), who describes signs in terms of intersecting planar features along with local and global signing space parameters for each sign. Handshapes comprise the most complex set of phonemes (Corina & Sandler 1993) and thus are the most difficult to describe. Attempts have been made at defining distinctive feature systems both from perceptual and gestural perspectives. From a perceptual point of view, for example, movement is often thought to be the most perceptually salient feature of a syllable in ASL and is therefore thought to be the syllable peak. Corina and Sandler survey recent work on ASL phonology, and find that no model has yet satisfactorily defined a full set of ASL phonemes or captured the phonological underpinnings of structural units in ASL. Nonetheless, it has been commonly accepted that the members of the sets of handshape, movement and location are by and large arbitrary in nature, that is, they are not meaning-bearing.

More recently, however, there has been some discussion of whether or not individual handshapes, locations, and especially movements, might in fact be meaningful beyond their phonemic status. In particular, Newport and Supalla (1980) suggest that when certain movements code verbal motion, they must be considered morphemic. Second, ASL is described as being a classifier language (see Supalla 1986 for a classifier inventory), with certain handshapes acting to classify sets of physical objects, especially according to size and shape. Third, Armstrong, Stokoe and

Wilcox (1995) claim that for at least some verbs in ASL, handshape corresponds directly with the subject or object of a clause, which makes them nominal. Armstrong et al. propose that such a sign contains all the elements of transitive clause structure: subject + transitive verb + object.

In this study, I examine the set of handshapes as they appear in the lexical category of verbs. Typically, verbs in ASL are understood to fall into three classes, as described by Padden (1988, 1990). These are non-agreement (or 'plain') verbs, agreement verbs which agree with subjects and objects, and verbs of motion and location which depend heavily on classifiers, and which are seen simply as various context specific movements of a noun represented by a classifier. Here I look at the distribution of handshape in ASL verbs, and in particular, which handshapes appear on the dominant and non-dominant hand for verbs involving both hands as articulators[1]. This study considers verbs that are not of the classifier predicate type, but lexical verbs. In this way I evaluate Armstrong et al.'s claim that handshape carries nominal features for at least some verbs.

I propose that nouns might attract handshapes that are conducive to noun-like elements, and therefore nouns in ASL would tend to have handshapes as a more psychologically salient feature of their make up. Verbs, on the other hand, designate a relationship between their arguments, and thus might have movement as their most salient feature, with the handshape seen as somewhat less salient. But even if the movement in verbs is salient, and has a tendency to be morphemic as Newport and Supalla (1980) suggest, movement in a verb does not occur without handshape(s) being present, and in fact, the handshape must be assumed by the signer before the movement can be articulated.

If handshapes are primarily phonemic in nature, their distribution in the category of verbs in ASL might be relatively even, but if more morphemic, certain handshapes might be represented more frequently. This study shows that the distribution is not in fact even, and that particular handshapes associated with the ASL classifier system, in which a single handshape represents a nominal entity, are the most frequent. The distribution is thus not arbitrary, but instead handshapes contribute semantically to the structure of the verb composed of movement plus handshape(s). Thus particular handshapes tend to appear depending on the meaning class of the verb, and as well, they associate with hand dominance within the verb, for which something might be said regarding semantic role. This study demonstrates that these handshapes are nominal, and further, may contribute animacy features to the meaning of the verb.

In the present study, I focus on two handshapes, the categories labeled /G/ and /B/ according to the classification in Klima and Bellugi (1979) (see Figure 1)[2].

1. THE OVERALL HANDSHAPE DISTRIBUTION IN VERBS. The description of handshapes in Klima and Bellugi (1979) is one of the earliest attempts at categorizing handshapes according to phonological variation. Klima and Bellugi base their discussion on Stokoe et al.'s (1965) prior discussion of handshape, movement and

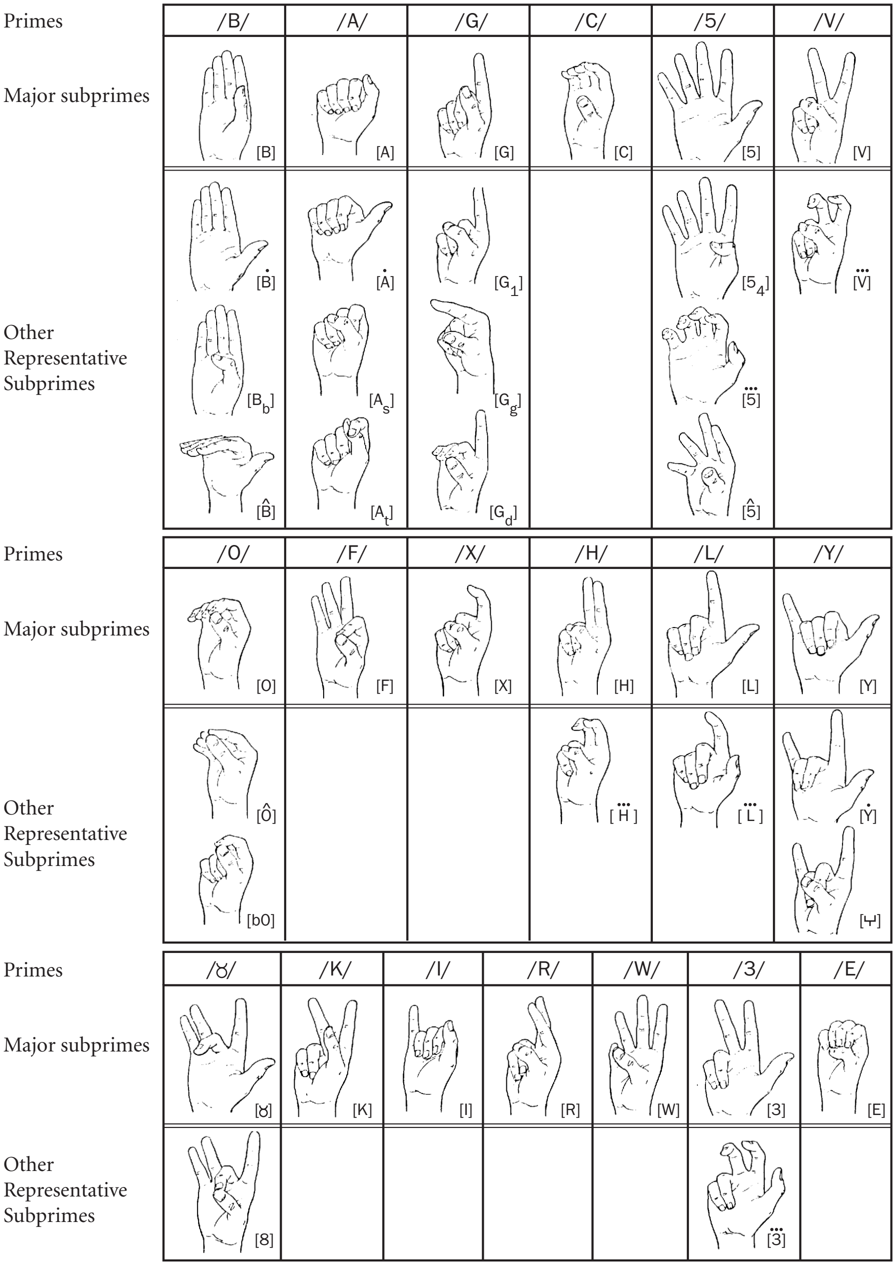

Figure 1. Handshapes listed by Klima and Bellugi (1979) in order of frequency as found in Stokoe et al. (1965).

location as sublexical components, but provide a more thorough description of these units. The present study compares frequency of handshape with Klima and Bellugi's categorization primarily because they ordered their handshape chart (Figure 1) according to the frequency of handshapes occurring in all signs listed in Stokoe et al.'s dictionary. The present study deals with the frequency of handshapes in verbs only, rather than with signs from all lexical categories generally, and Klima and Bellugi provide an excellent basis with which to compare.

1.1. SOURCE OF DATA. The verbs for this study were taken from a dictionary thought to be one of the most complete listings of the ASL lexicon, compiled by Sternberg (1981). Two hundred verbs were chosen as a database. There is some difficulty in calling Sternberg (1981) a true dictionary of ASL, since the entries are listed as alphabetically ordered English words, that is, 'translations' of signs. The single benefit of having the dictionary ordered in this way, however, is that selecting verbs for this corpus based on their entry label (English word translation) did not correspond to any particular handshape ordering. Thus, selection was made from the beginning of the dictionary and proceeded until 200 verbs were selected[3].

Each verb was listed according to 1) the initial handshape (HS-I) on the dominant hand only, which includes handshapes that remain constant throughout the articulation of the verb, 2) final handshape (HS-F) on the dominant hand only, which indicates that a handshape change from the beginning to the end of the sign takes place, 3) HS-I on the non-dominant hand only, once again meaning that the handshape remains the same throughout the sign, 4) HS-F on the non-dominant hand only, indicating that a handshape change occurs on the non-dominant hand distinct from whatever handshape (or handshape change) is found on the dominant hand, 5) HS-I for both hands when handshape is identical for both, and 6) HS-F for both hands when both undergo the same handshape change. For 200 verbs taken from Sternberg, a total of 282 handshapes occurs, which represents 82 instances of handshape change, or potentially two differing handshapes on each hand. In the analysis below, the total number of handshapes noted, rather than the total number of verbs, is the critical sum, since this study is investigating frequency of handshapes overall in the corpus of verbs.

1.2. HANDSHAPE FREQUENCIES. Klima and Bellugi's categorization of handshapes is given in Figure 1, with /B/ as the most frequent and /E/ as the least. Klima and Bellugi base this ordering on Stokoe et al. (1965), but they do not give figures for how many of each handshape they were able to count. Also, they say nothing about whether or not the handshape was initial or final, nor about whether the handshape was found on the dominant, non-dominant, or both hands.

Each of the handshapes found in the 200 verbs (282 handshape tokens in total) were tallied by phoneme class, ordered by frequency of highest to lowest, and compared with Klima and Bellugi's ordering. This comparison is given in Table 1. For the most part, both orderings are similar, which suggests that verbs in ASL are

Klima & Bellugi's order	HS frequency in verb study /282	Klima & Bellugi's order	HS frequency in verb study /282
1. /B/	66 23.4%	11. /L/	3 1.1%
2. /A/	57 20.2%	12. /Y/	**2 0.7%**
3. /G/	**30 10.6%**	13. /♉/	3 1.1%
4. /C/	**13 4.6%**	14. /K/	—
5. /5/	48 17.0%	15. /I/	1 0.4%
6. /V/	**11 3.9%**	16. /R/	1 0.4%
7. /O/	19 6.7%	17. /W/	—
8. /F/	14 5.0%	18. /3/	—
9. /X/	9 3.2%	19. /E/	1 0.4%
10. /H/	4 1.4%		

Table 1: A comparison of frequency of handshape (HS) occurrence in 200 verbs (282 total handshapes) taken from Sternberg (1981) compared to the order of handshapes occurring in all signs as suggested by Klima and Bellugi (1979). Frequencies not coinciding with Klima and Bellugi's order are in bold.

basically formed with the same handshapes as can be expected for signs other than verbs. This fact, when considered alone, suggests that even though some handshapes occur more frequently than others overall, there is nothing particularly unique about the relation of verbs and handshape. As will be seen, however, when handshapes in verbs are considered against other factors, such as initial and final position and dominant and non-dominant hand, an entirely different picture emerges. Several handshapes, shown in bold, do not correspond in frequency to Klima and Bellugi's order. /G/ and /C/ are the most striking, at 10.6% and 4.6% of all handshapes in the present corpus respectively. Differing from Klima and Bellugi's order, the /5/ handshape in the present study has a higher frequency than /G/ and /C/. As the frequency of handshape diminishes in the lower part of Table 1, however, differences in ordering are less consequential.

2. FREQUENCIES AND HAND DOMINANCE. When the frequency of the handshape is considered relative to its initial and final position in the sign, and relative to which hand it occurs on, a more interesting picture emerges. Frequencies for the handshapes /G/ and /B/ according to these categories are given in Table 2 (overleaf).

The columns labeled 'Dominant hand only, HS-F', 'Non-dominant hand only, HS-F', and 'Both hands, HS-F' in Table 2 represent verbs in which the handshape changes from the beginning to the end of the sign. It is clear that this is not all that frequent; this did not occur for either /B/ or /G/ on the dominant hand only,

HS	Dominant hand only HS-I	Dominant hand only HS-F	Non-dom. hand only HS-I	Non-dom. hand only HS-F	Both hands HS-I	Both hands HS-F	Total frequency of HS
/G/	16 (53.3%)	—	2 (6.7%)	—	12 (40.0%)	—	30 (100%)
/B/	7 (10.6%)	—	30 (45.5%)	—	26 (39.4%)	3 (4.5%)	66 (100%)
Total	23/80	0/16	32/42	0	38/120	3/24	96/282

Table 2. Frequency of handshape (HS) for each handshape phoneme by dominant/non-dominant hand and by initial/final handshape.

although it did for some other handshapes, but a change on the non-dominant hand only did not occur even once in these 200 verbs. In other words, if the two hands each have a different handshape, the non-dominant handshape always stays constant throughout the sign. The row of totals in Table 2 represents the total occurrences of /B/ and /G/ out of the total number of handshapes for all 200 verbs represented in the given column. Handshapes other than /B/ and /G/ are not reported in this discussion.

2.1. THE /G/ HANDSHAPE. The /G/ handshape, that is, the extended index finger with all other fingers closed into the palm, occurs 30 times in the corpus. Twenty-eight out of 30 instances of this handshape occur on the dominant hand only, or on both hands simultaneously.

An example of a verb occurring in the corpus with a /G/ handshape on the dominant hand only is ESCAPE, articulated with the /G/ protruding up between the index and middle fingers of the non-dominant hand, which is situated in front of the signer, palm down. The dominant hand moves sharply away from the non-dominant hand. The /G/ handshape here appears to prototypically represent an animate entity involved in an activity (escaping). It is of no surprise to find the same extended index /G/ handshape as the classifier both for humans and for tall thin objects, a clearly iconic correspondence. The verb ESCAPE typically appears in ASL dictionaries, suggesting it is widely considered a lexical verb, but its decomposition as classifier + movement is fairly transparent.

A second example of a verb with a /G/ handshape is ANSWER. The handshape itself does not here indicate animacy, but ANSWER is an example of metaphorical extension, wherein a more abstract object, a person's statement, moves from the speaker toward the recipient. While not indicating animacy itself, verbs such as ANSWER most typically involve an animate, if not human, originator. Many such verbs, in fact, extend from the signer's body, and thus maybe thought to associate with the most clear index of animacy, the signer's own body.

This handshape very rarely occurs on the non-dominant hand only, just twice in the corpus (6.7% of all instances of /G/). In CONTACT a dominant hand ([V] in Figure 1; fingers crooked) strikes the radial side of the extended index finger in the non-dominant [G] handshape. In this case, the agent of the action is not represented by /G/, even though a human animate agent is likely most prototypical. The /G/ handshape, however, is not the only handshape occurring on the dominant hand when animate agents are referred to. In the verb CONTACT, the /G/ occurs on the non-dominant hand, the recipient of the action (the dominant hand strikes the non-dominant). I would suggest here that the meaning of the verb prototypically involves contact between an agent and another person as patient, and thus the animacy feature of the /G/ handshape holds.

The /G/ handshape corresponds to an agent or actor, as in APPEAR and ESCAPE, or to a single entity such as in ANSWER, CANCEL, or ANNOUNCE where clearly an agent is involved. As such this handshape tends to designate the actor, but not the thing acted upon, unless this is also an animate entity[4].

2.2. THE /B/ CATEGORY. With the /B/ handshape, a very different picture emerges when hand dominance is considered. Out of 66 instances of /B/, with all fingers extended to form a flattened handshape, the highest percentage (45.5%) occurred on the non-dominant hand only, with the next highest frequency (39.4%) on both hands simultaneously. No verbs changed from a different handshape to a /B/, and only 4.5% of verbs with the same handshape on both hands changed to /B/ on both hands. Only 10.6% of this category occurred on the dominant hand only.

Examples of verbs with /B/ are COPY and CANCEL. In COPY the dominant hand has the handshape [5] (all such handshapes are listed in Figure 1), fingertips first touching the palm of the non-dominant [B], and then moving away and coming together as [O]. In COPY, the dominant [G] makes an ‘x’ on the palm of the non-dominant [B]. In both these verbs, an actor might be said to be performing an action on an inactive and inanimate surface.

Just 10.6% of /B/ handshapes occur on the dominant hand only, with a different handshape on the non-dominant hand, whereas 45.5% of the instantiations of /B/ occur on the non-dominant hand only. It is hypothesized here that the /B/ handshape makes a good surface upon which actions happen on or in relation to, and thus /B/ makes a particularly good patient. It does not, however, make a good actor or agent because surfaces, or objects with surfaces, do not act of their own volition, although they might be instruments.

Examples of verbs where /B/ does occur on the dominant hand only are COVER and FILL, and where /B/ occurs on both hands is CLOSE. In CLOSE, the two /B/ hands move together like two doors closing, with the final position of the hands in contact along the radial edge (closest to the thumb) of both index fingers in contact. This verb can be used with an animate agent as in *Bob closed the door*, with an inanimate subject or topic when no other agent is present, as in *the door closed by itself*, or when indicating a state. The handshape here corresponds to the object, but not the agent.

FILL is an example of a verb with the /B/ handshape on the dominant hand only. The /B/ handshape on the dominant hand slides across the top of the non-dominant [As] handshape with the radial side of the fingers facing up. Here, it might be seen that the /B/ is indicative of the top surface of some container, and is thus once again inanimate. This sign often occurs in a stative construction, with no agent indicated by the clause it appears in.

To summarize, the handshape /B/ appears to be used more for inanimate, object-like patients, and not for agents or actors, and this primarily accounts for its distribution on the dominant and non-dominant hand. This being the case, it cannot be said that the choice of /B/ as a sublexical unit is entirely arbitrary; in fact, the opposite is strikingly illustrated in this study.

3. CONCLUSIONS. In this paper I have shown that a purely structural description of handshape in ASL, especially in terms of discrete phoneme categories, is limited in terms of the contribution handshape makes in a given sign. Battison's (1978) Dominance Constraint, for example, suggests that only certain handshapes can occur on the non-dominant hand, and this makes an important contribution to the notion of marked and unmarked handshapes, but it says nothing about the function that the different handshapes and their variants may have. Clearly, while it is possible to describe handshapes purely in phonological terms, meaning comes into play at a very early stage. The distribution of handshapes in terms of initial and final position in the verb, and on the dominant and non-dominant hand discussed above suggests that handshapes do represent particular kinds of entities, and that these handshapes are more likely to appear in signs that have a semantic connection to the entity.

Browman and Goldstein posit that 'prelinguistic units of action are harnessed into (gestural) phonological structures through differentiation and coordination' (1992:155). This seems particularly true with a phonetic system that is contained in a relatively large space, and with articulators capable of finely differentiated articulation. The hands are particularly malleable, and the shapes they can assume are easily recognizable as icons. It must be the case that given an articulatory system able to gesture in such complex ways, signers opt for a phonology that takes advantage of semantics.

In the present discussion, we have seen that two viable and extensively used handshapes within the ASL system of phonemes pattern in markedly different ways, not in how they necessarily combine with phonological features of the language, but with their presence alongside particular meaning categories in ASL verbs. The /G/ handshape occurs frequently on the dominant hand, when an animate actor plus action reading obtains. The /B/ handshape is infrequent on the dominant hand, however, but appears instead on the non-dominant hand, and is frequently a passive and stationary counterpart in the role of patient. It is clear that rather than handshape being considered as belonging exclusively to phonemic categories, it is meaning-bearing well beyond distinct classifier constructions. I suggest that there can be no discrete division between such classifier use and lexicalized verbs, but that these fall along a continuum with the fully divisible classifier + movement construction at one end, and the more abstracted or frozen forms at the other, with most verbs falling somewhere between.

Of course the full story of phonology and meaning in ASL is more complicated than this. The present discussion has not dealt with notions such as 'instrument' nor with the interesting observation that while objects in the world may be disassociated with either an agent or with the signer as actual discourse participant, the signer's hands as objects are not divisible from the signer, which presents a problem for phonology and semantics in a signed languages equally. Nonetheless, I have tried to show that handshape does contribute meaning to the verb in ASL. Breaking the verb into what has been traditionally been thought of as its arbitrary, sub-lexical parts, actually results in several meaningful parts, indicating that such verbs might be considered morphologically complex.

Emmorey (1995) discusses gating studies in ASL which reveal that ASL signs can be identified earlier than English words (in similar studies). This she attributes to 'early and simultaneous availability of phonological information' (1995:49). It is possible, however, that at least in part, if certain handshapes carry meaning, this might be a contributing factor in overall word recognition, in that it is not strictly phonological information that triggers recognition of the lexical word as a whole.

Wilcox (1996) makes the suggestion that the hand, in relation to the ASL signer, is a good object in and of itself—that not only can it symbolize objects in the world, but that it *is* an object. I would like to take this suggestion a step further, and say that handshape may be the most salient feature of nouns in ASL. This not only supports the claim in Armstrong, Stokoe, and Wilcox (1995) that the dominant and non-dominant hands correspond to agent and patient respectively, it goes farther in suggesting that particular semantic features are determined by various handshapes assumed by the hand. Since a verb, which for at least some verb categories involves morphemic movement, is unrealizable without at least one handshape, we might consider the verb complex to be composed of a movement stem plus noun incorporation, indicating agent, patient, or both, and perhaps categories such as instrument and others as well.

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[1] Both hands can be employed in the articulation of signs, but one hand, usually the signer's dominant hand, typically carries the primary movement of the sign. It is often the case that when both hands are involved, each hand articulates a different handshape than the other.

[2] The results for /G/ and /B/ reported here are taken from a larger study in which all handshapes occurring in the corpus of verbs described below are examined. The labels 'G' and 'B' are alphabetic, but should not be taken as indicative of anything alphabetic within the ASL sign. They are simply convenient labels drawn from a system of fingerspelling English words that accompanies ASL signing.

[3] Detailed description of further selection criteria is not given here, but additional problems did arise. For example, the identical ASL verb form was given for several synonymous English word entries. When this occurred, the ASL verb was selected for the corpus only once.

[4] It is possible for the verb CONTACT (or HIT) to be used more metaphorically, and thus less prototypically, with the animacy feature bleached from the meaning. I suggest, however, that this extension is dependent on an original human, animate meaning.

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THE PRESERVATION OF PAUCAL:
AN EARLY GRAMMATICAL SPLIT IN SLAVIC

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Proto-Slavic (PSl) inherited three number categories from Indo-European (IE): singular, plural, and dual (compare Meillet 1969:292–300, Leskien 1962:79–81, 118, and Vasilenko 1965:288–89). These categories had distinct morphology in both declension and conjugation. Matthews (1960:198) says that by the 13th century there are numerous ‘mechanical slips’ involving *tri* ‘3’ and *četyre* ‘4’ in the documents, which show the shift of *tri* and *četyre* into a PAUCAL[1] (from Latin *paucus* ‘few’) category with *dva* ‘2’. This is exactly the period during which the inherited dual morphology was being lost. The simultaneous loss of dual morphology and the preservation and expansion of the paucal category is a remarkable juxtaposition that requires explanation.

A dual category has clear cognitive utility and plausibility. I suggest that a paucal category is also plausible, if less so than dual, and that it is cognitively useful. The expansion of the domain of dual into paucal is one indication of its plausibility and utility, and the expansion of the range of its application in Contemporary Standard Russian (CSR) is another. As Matthews notes, these expansions occurred during and in spite of the loss of dual inflectional morphology. Both expansions constitute the meat of the present study. Specifically, I show the dual morphology and paucal syntax in old Russian (OR) and their expanded applications in CSR. I discuss the cognitive plausibility of paucal and suggest the possible cognitive and grammatical reasons for the loss of the dual morphology. I then suggest the two possible ways in which a dual/paucal category could have been preserved morphologically, ways which are both cognitively and grammatically plausible. Finally, I tell how the paucal category was actually preserved and show that both cognition and linguistic structure influence the development of two Slavic language families.

1. EVIDENCE FOR DUAL AND PAUCAL CATEGORIES IN OR MORPHOLOGY. One indication of a dual/paucal category in OR is the existence of three numbers in the declensions. All nominal and most pronominal declensions showed a set of endings for singular, plural, and an intermediate category. The morphology of all three numbers for OR *o*-stem masculine nouns is given in table 1 (following page) with *plodъ* ‘fruit’ (Vasilenko 1965:288), where DU-PA stands for the intermediate (dual-paucal) category.

Paucal morphology also occurs in the verb conjugation. Table 2 (overleaf) provides an example in the present-tense conjugation of *nesti* ‘carry’.

	Singular	DU-PL	**Plural**
Nom	*plodъ*	*ploda*	*plodi*
Acc	"	"	*plodï*
Gen	*ploda*	*plodu*	*plodъ*
Loc	*plodě*	"	*ploděxъ*
Dat	*plodu*	*plodoma*	*plodomъ*
Inst	*plodъmь*	"	*plodï*

where *ě* is the *jat'*, a long, low front vowel
ъ is the hard or back *jer*, a super-short [ï]
ь is the soft or front *jer*, a super-short [i]

Table 1. Three numbers in OR *o*-stems.

	Singular	DU-PL	**Plural**
1	*nesu*	*nesevě*	*nesemь*
2	*neseši*	*neseta*	*nesete*
3	*nesetь*[2]	*nesete*[2]	*nesutь*

Table 2. Three numbers in the OR present-tense conjugation

Dual-paucal morphology can be seen in OR nominal declensions, in all pronouns but the interrogatives *kto* 'who' and *čto* 'what', which are *singularia tantum*, and in every tense of all verbs. It clearly had extensive applications. The first distinction between dual and paucal comes in the declension of the numbers 2, 3, and 4.

The declension of the numeral 2 is dual. In CSR there are extensive parallels in the declensions of 2, 3, and 4. The full OR declensions of 3 and 4 are lacking, but Old Church Slavonic (OCS) declensions for them are available. I give OR 2 and OCS 3 and 4 (Leskien 1962: 93) in table 3, along with CSR 2, 3, and 4. The CSR forms had developed by the early 15th century (Matthews 1960:198).

The declension of *trьje* 'three' and *četïre* is unique among numbers, though it parallels the plurals of some nominal declensions. Unlike the nouns, these divisions in the inflectional morphology of numbers suggests four sub-types: singular (1), dual (2), paucal (3–4), and plural (5–10).

The widespread occurrence of the (originally) dual category in OR provides the potential for communicating the paucal category suggested in the inflection of 3 and 4. But it does nothing to prove that such a category actually existed or, at least, had begun to evolve in OR. For that proof we need to look at the syntax of number phrases.

2. EVIDENCE FOR A PAUCAL CATEGORY IN OR SYNTAX[4]. There is direct evidence of a paucal category distinct from both dual and plural in old Slavic documents. Strictly speaking, however, it is not possible to prove this claim with purely OR texts. Yet the

	OR 2[3]	**OCS 3**	**OCS 4**	**CSR 2**	**CSR 3**	**CSR 4**
Nom	*dъva/dъvě*	*trьje/tri*	*četïre/četïri*	*dva/dve*	*tri*	*četyre*
Acc	"	*tri*	*četïri*	NOM or GEN	NOM or GEN	NOM or GEN
Gen	*dъvoju*	*trьj*	*četïrъ*	*dvux*	*trëx*	*četyrëx*
Loc	"	*trьxъ*	*četïrьxъ*	"	"	"
Dat	*dъvoma*	*trьmъ*	*četïrьmъ*	*dvum*	*trëm*	*četyrëm*
Inst	"	*trьmi*	*četïrьmi*	*dvumja*	*tremja*	*četyr'mja*

Table 3. The declension of paucal numerals.

	'table (msc)'	**'head (fem)'**	**noun case**
singular	*edinъ stolъ*	*edna glava*	NOM-SG
dual (2)	*dъva stola*	*dъvě glavě*	NOM/ACC-DU
paucal (3)	*trьje stoli*	*tri glavï*	NOM-PL
paucal (4)	*četïre stoli*	*četïri glavï*	NOM-PL
plural (5–10)	*pętь stolъ*	*pętь glavъ*	GEN-PL

Table 4. Number phrase syntax in OCS.

closeness of the old Slavic dialects enabled Cyril and Methodius to produce translations of biblical and Orthodox liturgical texts into OCS (a South Slavic dialect) that were comprehensible to the Bohemians and Moravians in the ninth century and, during the next century and a half, not only to Poles, West Slavs like the Bohemians, but also to the East Slavs in Kiev. So far as I am aware, there is no significant syntactic difference in the Slavic dialects at the earliest historical period and only minimal morphological differences. Of course, the number of texts is hardly overwhelming, so the lack of significant syntactic differences is not conclusive. Still, the degree of mutual comprehensibility evident from the exchange—not translation—of texts between old Slavic dialect areas suggests that the occurrence of evidence for paucal syntax in OCS is relevant to OR. This evidence is summarized in Table 4. All numerals are in the nominative.

There is more to be said than space permits, so I limit my comments on the syntax of number phrases to phrases in which the number is in the nominative. When the numeral is between one and ten, the distribution of forms is as given in table 4. In addition, a number phrase that has *dъva/dъvě* as the final number mentioned, e.g., *sъto dъva* '102', also requires a noun in the NOM-ACC dual. Number phrases with *trьje/četïre* '3/4' as the final numeral, e.g. *sъto trьje* '103', require a noun in the nominative plural. For number phrases between *pětь* 'five' and *desętь* 'ten', the noun must be in genitive plural. For number phrases between 10 and 20, the situation is somewhat different. The numbers 12, 13, and 14 govern not the paucal, but the genitive plural (GEN-PL). In OR numerals in this decade are expressed as the ones digit 'on ten', e.g. 12 is *dъva na desęte* '2 on 10'. The final numeral in the phrase is always *desętь* '10', never the 1, 2, 3, or 4, so only the genitive plural appears.

3. NUMBER CATEGORIES IN OR/OCS. At this point I pause to summarize the evidence for number categories in OR/OCS. Recall that I am assuming full parallels, if not identity, between the old Slavic dialects in this matter. If that parallel holds, we find evidence in the inflectional morphology, the lexicon, and the syntactic distribution of cases that leads to the conclusion of four categories: singular, dual, paucal, and plural. This is the evidence I refer to.

The inflectional morphology of nouns, pronouns, and verbs shows three distinct numbers. They correspond to the singular, dual, and plural of IE. The inflection of *dъva/dъvě* ‘two’ shows neither singular nor plural, only a dual, which is not surprising. This number provides lexical evidence for a dual distinct from both singular and plural. Similarly, the unique inflections of *trъje* ‘three’ and *četïre* ‘four’ provide lexical evidence for the paucal category. As the inflectional pattern again changes at *pętь* ‘five’, there is lexical evidence for a ‘plural’ numeral category. At the same time, the distribution of nominal case forms provides syntactic evidence for a paucal category (3/4) distinct from both dual and plural.

Still, we must take care that these categories are not imposed on the data by the researcher. But if they can be shown to be cognitively plausible and useful, the likelihood of accidental categories is diminished. I turn to the cognitive question now.

4. COGNITION AND PAUCAL. Inflectional, lexical, and syntactic evidence point to singular, dual, and plural categories in OR. There is some lexo-morphological and some syntactic evidence for paucal as well, but there is less of it than for the other three. Therefore, the cognitive plausibility of paucal should be made explicit.

No one questions the cognitive distinction between singular and plural, which is expressible in all languages lexically, if not morphologically. Many languages, like some of the Indo-European family, distinguish a three-way number morphology: singular, dual, and plural. Again, no one questions the cognitive plausibility of this in a species that displays bilateral symmetry: all of our body parts are either midline and singular or come in left-right pairs. Clearly the dual category is cognitively plausible. Presumably there would not be a paucal category in OR if the paucal category did not have cognitive plausibility, nor would the dual have expanded into the fully-fledged paucal of CSR. It is also reasonable to assume that paucal would not have demonstrated such tenacity in Slavic if it were not merely cognitively plausible but useful. At the same time, its cognitive plausibility should probably not be as obvious as that of either dual or plural, because paucal is a much rarer category.

I suggest that the cognitive plausibility of paucal is found in the original computing machine, the human hand. I stipulate the singular nature of the number one and the duality of two. The number five, a handful, is plural beyond question. Make one further assumption, that a handful is *required* for plurality. This leads us to the cognitive plausibility of paucal. Three and four comprise everything between two and five, everything between dual and plural. That is, three and four are clearly more than singular or dual, but they are not enough to be plural. Hence, paucal[5].

6. THE LOSS AND SPREAD OF PAUCAL. In the Old Russian period the unique dual morphology disappeared from both nominal and verbal inflections. The details of the historical process are not central to the present topic, but it is possible to outline the sequence here. As to motivation, note first that the frequency of dual with anything but paired body parts or specific number amounts is likely to have been low. Second, the most common dual case would have been the NOM-ACC paucal, which is identical to the genitive singular (GEN-SG) in masculine *o*-stem nouns and the soft (*ja*-stem) feminines. Where there was a difference in the *o*-stems, it had to do with accent shift only. This shift remains in CSR in four nouns: *čas* 'hour', *šag* 'step', *šar* 'sphere', and *rjad* 'row' (compare *do čása* 'up to one o'clock (GEN-SG)' with *dva časá* 'two o'clock (OR NOM/ACC-DU accent))'. But this kind of accent shift is rare in CSR and presumably in OR. Otherwise the GEN-SG and NOM/ACC-DU are identical for these two declensions.

In spite of the potential for the loss of the dual morphology, the four-way syntactic split (singular-dual-paucal-plural) remained and provided a countervailing effect. Yet Matthews (1960:198) notes that the merger of dual and paucal (into what became the paucal category) was well-advanced by the 13th century, just as the distinct dual morphology disappeared.

In OR the adjectival declension was like the nominal. By the time the third-person pronouns had fused with the adjectives to produce the long-form declension in middle Russian, the dual morphology was gone. The new adjectives had only singular and plural forms, with no trace of dual in their morphology. This is the situation in CSR.

Another motivation for the loss of the dual morphology is found in the verbs. The most common of the conjugation endings would be the third person dual, which was originally identical to the second person plural. Contrast this with the situation involving the other two numbers: in no case, nominal or verbal, is there a syncretism between a singular desinence and any plural one. Surely the potential for the loss of dual morphology in nouns and verbs was there at the beginning.

However, if we look at paucal in terms of its syntactic distribution, we can see that it is not only healthy but even expanded today. As in OR, countable quantities that occur with a number that ends in 1 are in the NOM-SG: *sto odin stol*$_{(\text{NOM-SG})}$ '101 tables'. Countable quantities that occur with a number that ends in 2, 3 or 4 are in the genitive singular (GEN-SG): *sto tri stola*$_{(\text{GEN-SG})}$ '103 tables'. Countable quantities occurring with numbers that end in 5 or greater are in the genitive plural (GEN-PL): *sto sem' stolov*$_{(\text{GEN-PL})}$ '107 tables'. The parallels in the declensions of *dva/dve*, *tri*, and *četyre* remain, and these morphological parallels are still formally unique.

Moreover, there is a further occurrence of paucal for which I know of no OR evidence: the metaphorical usage of the preposition *po* in the meaning 'apiece'. There is a set of cooccurrence restrictions on the cases of the numeral and the noun in these expressions that is without structural motivation in the absence of paucal. The structural facts that are of central interest to the present study are easily outlined. The preposition *po* governs dative (DAT) and accusative (ACC) cases.

	po + DAT	*po* + ACC
1	*po (odnomu) jabloku*	*
2	*	*po dva jabloka*
3	*	*po tri jabloka*
4	*	*po četyre jabloka*
5	*po pjati jablokam*	*po pjat' jablok*

Table 5. 'Apiece' usages. (* = does not occur)

In concrete usages, the meanings of *po* + DAT and *po* + ACC differ slightly, but both are used to communicate the metaphorical usage translated as 'apiece' (cf. Sullivan 1998:68–70 and Pul'kina 1987:133). Yet the two constructions do not occur in free variation. They show a clear structural distribution that parallels the singular-paucal-plural split. True singular, '1', has DAT-SG on number and noun alike: *po (odnomu) jabloku* 'an (one) apple apiece'. Paucal, e.g. *po tri jabloka* '3 apples apiece', takes ACC-SG on the number and GEN-SG on the noun. ACC-SG does not occur with '1', and DAT-SG does not occur with paucal. Plural, e.g. '5 apples apiece' can occur with either DAT on the number and DAT-PL on the noun (*po pjati jablokam*) or with ACC on the number and GEN-PL on the noun (*po pjat' jablok*). With 5 and above, the usage of ACC vs. DAT seems to be in free variation. All of these are consistent with the distribution of inflectional morphology in number phrases, and the facts are summarized in table 5.

The distribution in table 4 reflects the singular-paucal-plural distinction: DAT with singular (one), ACC with paucal, and either with plural. This is clearly an expansion of the distribution of a paucal category, both syntactically and morphologically, in the face of the loss of the paucal morphology. This suggests that the paucal category had serious cognitive utility for speakers of OR. The cognitive utility of the merged dual-paucal (hereafter simply paucal) remains as cogent as it was in the explanation given in section 5. It is just somewhat more streamlined. That is, 1 requires singular. A handful (5) is required for plural. Paucal (2-3-4) is everything between singular and plural. It is clearly not singular, but it is insufficient for plural. Yet the paucal was consolidated in this way even as the formal syncretisms in desinences led to the loss of the distinct morphological forms. This is a serious disparity that requires explanation, leaving us with two questions. Specifically, how can a grammatical category be retained when its morphological uniqueness is lost, and what is the cognitive mechanism that permits such retention? I take these questions in order.

6. THE PRESERVATION OF PAUCAL. Consider first that OR was an inflecting language. Nouns, adjectives, and pronouns had six grammatical cases[6] in three numbers. In an inflecting language each desinence is a portmanteau morph that realizes case and number indistinguishably. For example, the GEN-PL ending of *stolov* 'tables' is *-ov*. It is not possible to say that the *-o-* communicates GEN and the

-v communicates pl or that the *-v* communicates gen and the *-o-* communicates pl. Pl and gen are realized together as *ov*, a classic portmanteau realization. So the loss of the portmanteau morphs for the paucal morphology should have been disastrous for the category.

However, the disaster was not unavoidable. Case and number are functionally distinct. That is, number is a semantic or pragmatic category. Number is related to semantic and real-world realms outside of language. The concept of number itself is as potentially universal as any that has been suggested. It is, of course, possible to divide up number in different ways,[7] but counting and enumeration seem to be universal properties of human societies. Cases, to the contrary, are grammatical (syntactic and morphological) and language-specific. In short, number and cases are logically distinct above the level of morphology, where they fuse in Russian. In particular, they are distinct in syntax, where the distribution of paucal must be specified. This logical distinctness is the key to the preservation of paucal.

As the paucal morphology disappeared, or maintained the difference by partially separating case and number morphologically. Recall that in or, as today, the number *one* was accompanied by a noun in nom-sg. Numbers beginning with *five* were accompanied by gen-pl. The shift from singular to paucal is signaled in csr by holding number (sg) steady and changing the case from nom to gen. Then the shift from paucal to plural is signaled by holding the case steady (gen) and changing the number from singular to plural. This approach is linguistically effective. It preserves, in the absence of a distinct morphology, a grammatical category that is both useful and cognitively plausible.

7. cognitive plausibility and science. The description given is cognitively plausible[8]. The plausibility is shown by the use of cognitively distinct syntactic elements to maintain a paucal morphological category despite the loss of the original morphology. The utility of paucal is shown in the way it expanded its syntactic distribution even in the face of potential morphological disaster. One question remains: can this description be validated empirically?

A scientific approach considers a set of data, hypothesizes every possible explanation for the data, and empirically demonstrates that only one of them cannot be shown to be impossible. That is, it invalidates all but one of the possible explanations. But this isn't quite the situation here.

If I am right about the way paucal was preserved, there are only two[9] possible alternatives here: the one I describe in section 6 and one more. Consider this second situation: the shift from singular to paucal is signaled by changing the number from singular to plural while leaving the case in nom. Then the shift from paucal to plural is signaled by holding the number steady at plural while changing the case from nom to gen. These two alternatives are summarized in Table 6.

Table 6a is what I hypothesize as the way paucal is preserved in Russian. This suggests that or reanalyzed the nom/acc dual as the gen-sg, which is what most Russians would say is the case today. Table 6b is the only other reasonable alternative,

A. 1	NOM	SG	B. 1	SG	NOM
2	↓	↓	2	↓	↓
3	GEN	↓	3	PL	↓
4		↓	4		↓
5		PL	5		GEN

Table 6. Two possible preservations of paucal.

the one that a scientific approach should prove is impossible. It would be equivalent to abandoning the dual entirely and expanding the original paucal distribution from 3/4 to include 2. However, the 6B alternative cannot be proved impossible. It is not only possible, it happened. It's Polish[10]. Table 6 thus represents a very early grammatical shift between Old East Slavic (OES) and Old West Slavic (OWS). In short, there are two plausible ways of preserving paucal. Either by itself would suffice. Both occurred. Each one was centered on a single dialect area. Table 6A helps to define OES (OR in the present study) and table 6B helps to define OWS, the ancestor of contemporary Polish.

8. ANOTHER PREDICTION. One further point must be made. The degree to which a description is logically tight is indicated by the accuracy of the predictions it permits. Section 7 has one of these accurate predictions, i.e., that both possible ways of preserving the paucal category can occur. There is a second prediction. Neither of the alternatives presented in Table 6 can apply to verbs, as it is available only to lexemes inflected for case. Therefore, this description predicts that when the paucal morphology was lost with verbs, the category would not be preserved. Indeed it was not.

9. CONCLUSIONS. The cognitively useful dual category expanded twice in Russian, first to include a full paucal category, then to the metaphorical 'apiece' usage. The formal confusion in the morphology of paucal led to the loss of paucal morphology and threatened the category itself. There are two cognitively and grammatically (or semiotically and structurally) plausible ways that the category could be preserved in nouns, namely by taking advantage of the distinctness of case and number. Neither mode of preservation can be shown to be superior to the other in utility or cognitive plausibility, so both must have been possible. Both modes of preservation occurred. Each one helps to define a different daughter language and persists in a branch of the Slavic family to the present day. Neither of these alternatives is available for verbs, and the paucal category is completely lost in verbs.

Finally, the historical changes in both OES and OWS are compatible with cognitive and grammatical considerations. But we will have to look elsewhere to find a language change that provides an empirical test in which cognition causes a linguistic change.

[1] I am indebted to David G. Lockwood of Michigan State University for suggesting this term and for a substantial number of suggestions that not only corrected errors of mine but improved this paper immeasurably. If any errors or shortcomings remain, the responsibility is mine, not his.

[2] Alternate forms occur in OR manuscripts.

[3] In OR *dъva* was used with masculine nouns and *dъvě* with feminine and neuter nouns. In CSR *dva* is used with masculines and neuters and *dve* with feminines.

[4] Boris Unbegaun, in his class on the history of the Russian literary language, pointed out that the purest OR text is *Russkaja pravda* 'Russian law'. Most texts are mixed OR and OCS, often with the latter dominating, and the most extensive texts are religious ones, which are almost entirely OCS. In short, it is impossible to prove that a particular syntactic distribution was OCS and not OR or vice versa.

[5] For other examples of a cognitive relation between the human hand and numbers see Copeland 1998 and Sullivan 1999.

[6] And a vocative, which I ignore.

[7] See Sullivan 1999 for the different ways English has used.

[8] The description is also neurologically plausible, because the OR and CSR systems can be described in pure relational network terms consistent with what we know about neurology. In the interest of space limitations, I leave this part of the description aside.

[9] Actually, there is a third: a whole new set of morphological endings could have been created, presumably *ex nihilo*. I ignore this possibility, mainly because it didn't happen.

[10] Grammars of Russian state that paucal number phrases with feminine nouns can take NOM-PL adjectives, matching the Polish situation. When pressed on the matter, however, native speakers become less and less comfortable with such forms, sometimes refusing to provide examples or make grammatical judgements. Large-scale tests are needed to determine the actual facts here.

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PASSIVES WITH *SHOD-AN* IN PERSIAN: A LEXICAL AND SYNTACTIC ANALYSIS

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This paper studies the passive verbal structures with *shod-an* 'become' in Persian. I claim that (so-called) passives in Persian are not periphrastically derived from the corresponding active sentences. Rather, passives in Persian should be defined in purely structural terms as an independent construction containing a complement verb (past participle), or phrase, which requires that at least one NP of the complement verb/phrase be coreferential to the subject of the matrix clause. That is, the passives with *shod-an* behave as independent inchoative active verb phrases. *Shod-an* is not an auxiliary, but rather a main light verb. Syntactic passives function as input to lexical morphological rules.

introduction. The use of passive verbs in older Persian texts is very rare (Najafi 1987). The passive verb, i.e., the past participle of the main verb (ppmv hereafter) plus the auxiliary *shod-an* 'become', is used when there is no need to express an indirect object (an agent *by*-phrase):

(1) *Mehran nāmeh rā nevesht* (Active)
Mehran letter ra(acc) wrote.ps
'Mehran wrote the letter'.
(2) *nāme nevesht-e shod.* (Passive)
letter written.ppmv became.ps
'The letter was written'.

In (2) the agent of the action is unknown, or the speaker does not want to name him. In Persian, passive is used when the agent is unknown, or the speaker does not want the agent to be known. When the speaker wants to express the agent there are two possibilities. The first is the use of an agent by-phrase in the passive clause, which is rare and renders the clause very odd as in (3):

(3) *nāme tavassote Mehran nevesht-e shod.* (Passive)
letter by/by means of Mehran written.ppmv became.ps
The letter was written by Mehran.

However, the use of an agentive *by*-phrase with the passive verb in order to focus on or introduce the agent is very odd, (3), and Persian speakers prefer to use the corresponding active sentence in which the direct object+*ra* precedes the subject in the active clause as in (4) (cf Najifi 1987):

(4) *nāme rā Mehran nevesht* (Active)
letter Mehran written.PS
'The letter Mehran wrote'.

The second option to express an agent, as noted above, is the use of the active verb. That is, Persian speakers prefer to use the active clause (6) rather than the passive (5) in order *to simultaneously topicalize or express the old information/topic* (patient), and to focus on the new information (the agent *by*-phrase) by scrambling the DO-*ra* to a position before the subject of the active clause.

(5) *goldān tavassote bache shekast-e shod.* (Passive)
vase by child broken.PPMV became.PS
'The vase was broken by the child'
(6) *goldān ra bache shekast.* (Active)
vase ra(ACC) child broken.PS
(lit.) 'The vase the child broke'.

However, when the agent is unknown or the speaker does not want the agent to be known, the passive is used without the agent *by*-phrase.

(7) *goldān shekast-e shod.* (Passive)
vase broken.PPMV became.PS
'The vase was broken'.

While Moyne (1974) and Najafi (1987) correctly argue for the rarity and oddness of passive verbal structures, specifically agentive passives, they concede the existence of periphrastic passive in the language and consider cases like (2),(3), (5) and (7) all as periphrastic passives. Moyne (1974), however, denies the existence of any morphological or syntactic category of passive in Persian and considers structures like (2), (3), (5), and (7) as inchoative active verbal structures.

1. CLASSIFICATION AND PROPERTIES OF PASSIVES WITH *SHOD-AN*.

1.1. CLASSIFICATION. There are no *be* passives in Persian. On the other hand, Persian is a language with few simple verbs. The passive verbal structure, i.e., PPMV+*shod-an*, is not the only structure with *shod-an*, but are rather only one of a number of verbal structures with *shod-an*. The following is a classification of these verbal structures with *shod-an* into four groups:

1.1.1. GROUP I. These are the standard analytic passive constructions with the past participle (PPMV) of simple transitive verbs (all examples are in infinitive forms):

(8)	a. *did-an* ‘see’	a'. *did-e shod-an* ‘be/become seen’
	b. *kosht-an* ‘kill’	b'. *kosht-e shod-an* ‘be/become killed’
(9)	a. *ārāst-an* ‘decorate’	a'. *ārāste- shod-an* decortated.PPMV become.INF ‘to be/become decorated’
	b. *ālud-an* ‘pollute’	b'. *ālud-e shod-an* polluted.PPMV become.INF ‘to be/become polluted’

1.1.2. GROUP II. Complex Predicate structures (CP) with *kard-an* ‘do’ and their intransitive counterparts with *shod-an*—N+*kard-an* and N+*shod-an*:

(10)	a. *kansel-kard-an* (transitive) cancel-do.INF ‘to cancel’	a'. *kansel-shod-an* (intransitive) cancel-become-INF ‘to be cancelled’
	b. *‘e‘dām-kard-an* (transitive) execute-do.INF ‘to execute’	b'. *‘e‘dām-shod-an* (intransitive) execute-become.INF ‘to be executed’
(11)	a. *hamle-kard-an* (intransitive) attack-do.INF ‘to attack’	a'. **hamle-shod-an* attack.INF ‘to become attacked’
	b. *mosāhebe-kard-an* (intrans.) interview-do.INF ‘to interview’	b'. **mosāhebe-shod-an* interview-become.INF ‘to become interviewed’

(12) a. *be Irān hamle shod.*
to Iran attack became.PS (lit. ‘Iran was attacked’)
b. *bā ‘u mosāhebe shod*
with him interview became.PS (lit. ‘he was interviewed’)

The set of CPs (left transitive column in (10)a–b) form verbal constructions with *shod-an* (right column (10)a'–b'). Verbs in (11)a–c are intransitive, but take PP-internal arguments. There are sporadic, unpredictable impersonal passives with *shod-an* in this subgroup, (12)a–b, but they do not nominalize and may very rarely undergo derivational word-formations, as in the ungrammatical infinitive forms found in (11)a'–b'. The dichotomy is completely predictable, productive, and transparent.

1.1.3. GROUP III. Causative/transitive CPs Adj+*kard-an* and intransitive Adj+*shod-an*:

(13)	a. *sard-kard-an* cold.do.INF ‘make cold’	a'. *sard-shod-an* cold.become.INF ‘become cold’
	b. *xoshk-kard-an* dry.make/do.INF ‘make dry’	b'. *xoshk-shod-an* dry.become.INF ‘become dry’

This is a highly productive, predictable group. The compound verbal constructions (CPs) in both sets undergo productive word-formation and derivational rules.

1.1.4. GROUP IV. The set of verbal constructions with *shod-an* that do not have corresponding causative/transitive forms, e.g., (14). We may include in this group those impersonal constructions where the verbal part, *shod-an*, is 3rd person singular/neutral. Many of these constructions do not seem to have corresponding active, transitive counterparts; neither do they have *masdar*/infinitive forms, e.g., (15):

(14) a. *moujeb shod-an*
reason become.INF 'to cause'
b. *shamel shod-an*
inclusion become.INF 'to include'
(15) a. *'abr shod*
cloud become.PS 'it became cloudy'.
b. *mahtab shod*
moon became.PS 'it became moonlight'

Given the classification of verbal structure with *shod-an*, the next section briefly presents certain morphological and syntactic characteristics of these constructions.

1.2. MORPHOLOGICAL PROPERTIES. All different verbal constructions with *shod-an* presented in section 1.1 also show properties of synthetic compounds and may undergo many productive derivational word-formations that otherwise apply to simple verbs. The infinitive/*masdar* form *shod-an* is a derived word just like English gerunds, e.g., (16):

(16) $[_{N}$ $[_{V0}$ sho-d] + [-an]]
become (present stem) + -d /-t (past morpheme) + -an (nominalizer)

A similar derivation is assigned to all complex, synthetic infinitives with *shod-an*—that is, the *-an* affix is added to the compound verbal stems made up of the PPMV/N/Adjs + *shod* (underlined)—example (17). However, it is incumbent upon us to account for the formation of these compound synthetic verbal heads:

(17) $[_{N}$ $[_{V0}$ [nevesh-t-e] + [sho-d]] + [-an]]
written.PS.PPMV become.PS.an 'become written'

Both simple and compound infinitives carry a single stress on the last syllable, *-tan* / *-dan*, indicating their status as words. Both simple and compound infinitives, including all those with *shod-an*, behave like single nominal heads and may function as subjects, direct objects, indirect objects, heads of NP constructions, and occur equally in all positions sanctioned for such NPs. Nouns and infinitives normally occur after the phrase *dar hāle* 'in the process of' in Persian:

(18) a. *'u dar hāle david-an 'ast*
he in process run.INF is 'He is in the process of running'.
b. *'u dar hāle bidar-shod-an 'ast*
he in process awake-become.INF is 'He is in the process of getting up'.
c. *nāme dar hāle neveshte-shod-an 'ast*
letter in process written-become is 'The letter is in the process of being written'.

Simple adjectives pluralize in Persian like nouns. Similarly, the complex PPMVs with *shod-an*, i.e., PPMV/N/Adjs + *shod-e* can also pluralize:

(19) a. [[kosht-e shod-e] + g-an]
[killed.PPMV become.PPMV] + PLUR 'the killed ones'
b. [['e'dām shod-e] + g-an]
[execute.become.PPMV] + PLUR 'the executed ones'

Even the negative inflectional prefix *na-* is also involved in word-formation:

(20) a. *faramush-shod-an-i*
forget-become.INF.ADJ 'forgetable'
b. *faramush-na-shod-an-i*
forget-NEG-become.INF.ADJ 'unforgetable'

The data provided above clearly show that passive structures with *shod-an* in Persian undergo productive morphological rules indicating their status as morphological units, $[_{V0}\ X^0 + V^0\ ]$ where X^0 stands for PPMV, ADJ, N, etc. However, being passives, they clearly have many properties of syntactically-formed phrases. In the next section, I claim that *shod-an* is not an auxiliary, but is rather an unaccusative main verb, thus accounting for syntactic and morphological properties of *shod-an* structures.

2. *SHOD-AN* AS A MAIN LIGHT VERB. *Shod-an* is a 'defective verb' or a 'light verb' (LV). Full lexical verbs consist of both (1), universal 'logical constants' (like CAUSE, EVENT, STATE, BECOME, BE, DO and GO) and (2), 'non-logical content' (corresponding to pure thematic and semantic meaning/sense) that distinguish, for example, two process verbs like *laugh* and *play*, with an identical 'logical constant', DO.

Taking *shod-an* as a LV, I suggest that it consists of logical constant BECOME, and lacks non-logical semantic sense. This in turn predicts that *shod-an* must count as the morpho-syntactic head of all the syntactic and morphological constructions in which it occurs. However, these constructions require a thematic/semantic unit/head in order to form a full verb/predicate. Adjectives, nouns, PPMVs, PPs in group I–IV compound verbs and in constructions with *shod-an*, count as such non-logical units or semantic heads (see Webehuth & Ackerman 1992 for a similar analysis for the German passives).

Shod-an is indeed a (light) main verb, and counts as the morpho-syntactic head in all the constructions that it occurs in. In Persian the negative prefix *na-*, the subjunctive prefix *be-*, and the indicative prefix *mi-* all affix to the (first) simple main verb, as well as to the verbal head of compound verbs. These same inflectional affixes always attach to *shod-an* in all the verbal constructions, and refuse to affix to the PPMV of the seemingly main verb, i.e., they recognize the verb *shod-an* as the main verb.

4.1 *SHOD-AN*: AN INCHOATIVE, UNACCUSATIVE VERB. The sense of *shod-an* is clearly 'to become' or 'come about' (Moyne 1974:258). Jahān Panāh (1984) defines *shod-an* as a 'momentary' verb indicating an instantaneous change from one action, state, event to another action, state or event. In traditional grammars of Persian *shod-an* was said to denote *seyrourat* or 'becoming'.

Following Smith's (1970) analysis of verbs of 'change class', in English, I suggest that *shod-an* belongs to the class of verbs that indicate an 'independent activity', but require an 'external control(ler)'. Levin and Hovav (1995) call them 'Externally Caused Eventually' verbs. These are also known as 'causative or ergative alternation' verbs like *break*, *open*, *clean*, etc. Such verbs can occur independent of an external controller, like the Persian examples with *shod-an* and English example *the glass broke*. But even in such cases an external cause is implied in their sense of meaning. An important property of such verbs is that they do not exert any restriction on the thematic type of their external controller, i.e. it can be an agent, an instrument, natural force, or a volitional or non-volitional act or any circumstance.

Building on such work, I suggest a complex Lexical Conceptual Structure (LCS) as shown in (21) for all occurrences of *shod-an* in Persian, where shod-an sentences refer only to the second sub-event (B), which includes the STATE part (C). However, the whole LCS counts as part of its thematic meaning and the external controller refers to the A part:

(21) $[[_{\text{CAUSE}}$ X do something] CAUSE $[_{\text{INCHOATIVE}}$ [Y COME TO] [STATE BE Shekaste 'broken']]]
A B C

Let us now compare sentences with *shod-an* and their English glosses:

(22) a. *ali goldān rā shekasht* (Active)
Ali vase ra broke.PS.3SG 'Ali broke the vase'.
b. *goldān shekasht* (Active)
vase broke.PS.3SG 'The vase broke'.
c. *goldān shekasht-e shod* (Passive)
vase broken.PPR became.PS.3SG 'The vase was broken'.

Both the Persian and English gloss in (22)b count as the intransitive, unaccusative alternants of the transitive (22)a. However, the Persian and English passives in (22)c do not match. The Persian (22)c still indicates a 'change of state' event via *shod-an*, referring to part B of (21) while the English gloss (22)c is a stative event referring to part C of (21).

The Persian sentences (22)b and (22)c denote identical inchoative or change of state types of events. They differ in that in (22)b the simple verb *shekast* 'broke' contains both the logical constant BECOME, and the non-logical content *shekast-an* 'break, or separation in material integrity', while in (22)c (*shekat-e shod* 'become broken') the logical constant and the non-logical content are realized by two independent predicates (hence a Complex Predicate) and both directly refer to the B part of (21). However, I believe that the whole LCS (21) is part of the lexical sense of all Persian and English sentences in (22). The external cause is implied in (22)b–c, but realized in (22)a.

Since the B part of (21) is cross-linguistically realized as an unaccusative verb, I suggest Figure 1 for all the various uses of *shod-an* in Persian where it takes a 'Predicate Phrase' (Pred P) as its sister complement or Direct Object.

Clearly, in Figure 1, *shod-an* is the head verb and Pred P is its complement, corresponding to preverbal PPMV, predicative Nouns, Adj Ps, etc. in group I–IV verbs with *shod-an*. Pred P is realized by the past participle *shekast-e* 'broken' in (21)–(22)c. The subject, Y, in part B of (21), or the subject of the passive in (22)c, *goldān* 'vase', refers to a direct internal complement (DO) of the Pred P. I suggest Figure 2 for the whole LCS (21) which exemplifies the examples in (22) as well. As the trees in Figures 1 and 2 clearly indicate, *shod-* is the head of the INCHOATIVE clause. Being an unaccusative verb, its underlying internal argument, Y, occurs as its surface subject (22)c.

Impersonal clauses with *shod-an*, (12)a–b, occur when the nominal predicate, Pred P in Figure 2, lacks a direct internal complement (NP). The underlined PPs in (12)a–b are indirect internal complements of *hamle* 'attack', and *mosāhebe* 'interview'. They replace Y in (24). Since there is no NP complement to occur as the subject of the clause, we end up with an impersonal, subjectless clause. The predicate nominals *hamle* 'attack', and *mosāhebe* 'interview' replace the head of the Pred P in Figures 1 and 2.

My analysis so far provides a simple, and unified account of group I-II verbs. I do not consider verbal constructions with *shod-an* as periphrastic, passive derivations of some corresponding active forms. Rather, *shod-an* passives are independent clauses that correspond to the second sub-event of part B in (21), ergative alternation verbs. The universal properties of ergative alternation verbs are: (1) their second sub-event may occur independently of the causative active sentences; (2) their second sub-events are universally realized as unaccusative verbs, and (3) an external cause is still part of their sense of meaning. *Shod-an* is a light verb of the second sub-event.

Considering group III verbs, i.e., causative Adj + *kard-an*, and intransitive Adj+*shod-an*, I assign a structure like that found in Figure 3 to adjectives cross-linguistically where the adjective is the complement of a zero stative verb, with a subject or specifier (order irrelevant) (cf. Hale & Keyser 1994).

Thus, for the sentences in (23), corresponding to (13)b–b', I assign a structure like that found in Figure 4 where the whole adjectival XP (Figure 3) counts as the Pred.P.

(23) a. *'āftāb gol-hā rā xoshk kard*
sun flowers ra dry made.PS
'The sun dried/withered the flowers'.
b. *gol.hā koshk shod-and*
flowers dry became.PS
'The flowers (became) withered'.

The whole XP (Figure 3) occupies the complement position, Pred P, of the unaccusative verb *shod-an* in Figure 1. YP is its specifier and moves to Spec-IP as the subject in (23)b. On the other hand, YP is internal to the projection of *shod-an*, which shows that the underlying internal argument of an unaccusative verb functions as its surface subject. YP is also the direct object of the corresponding causatives in (23)a and (13)b, a perfect match for both ergative alternation verbs and active vs. passive.

Similarly, in group IV verbs, (14)–(15), the preverbal predicate nominals replace the Pred-P in (21) and Figures 1 and 2. The preverbal nouns, i.e., *moujeb* 'cause', *sabab* 'cause', etc., in (14) do have a full-fledged argument structure and LCS. So when they occupy the Pred P in (21) and Figures 1 and 2, an NP argument of theirs occupy the subject position. The cause predicate is still part of their implied meaning. The predicate nouns in set (15) do not have a complex argument structure and lack any arguments, resulting in subjectless V's as in (15). Since I do not consider verbal constructions with *shod-an* as the passive derivations of active verbs, lack of active transitive counterparts in this set do not count a problem in my theory.

My simple, unified analysis so far indicates that verbal constructions with shod-an are instances of analytic complex (passive) predicates derived in syntax. They have phrasal properties, and a unique syntactic X-bar structure; Figures 1 and 2 were suggested for the various uses of *shod-an*. *Shod-an* was shown to be the morpho-syntactic head of all the syntactic and morphological constructions in which it occurs. The pre-verbal constituents (PVs), i.e., PPMV, NPs, APs, PPs, etc, that occur as the semantic head of complex predicates with *shod-an* stand in an identical complement relation, within V', to the main verb *shod-an* as in Figure 1, i.e, [$_{V'}$ Pred P (=PV) + V0 (=*shod-an*)].

4. MORPHOLOGICAL ANALYSIS. The verbal constructions with *shod-an* exhibit properties of synthetically-formed compounds (section 2) where *shod-an* behaves as the verbal/morphological head of the complex, that is otherwise reminiscent of simple verbal heads in Persian. The question is whether this dual property can be accommodated within a lexicalist view of grammar that assumes a division of labor between syntactic rules and derivations and lexical word-formation rules and derivations.

Webelhuth and Ackerman (1992) in their study of German passives suggest that lexical rules and operations need not simply apply to single, zero-level category items, rather they may apply to units larger than single, zero-level categories. They concede that lexical rules may apply to German analytic, complex passive predicates (within the lexicon). They consider the domain of predicate formation to be 'functional wordhood'. Functional Words (FW) are lexical units, with certain phrasal properties, which are relevant for argument and grammatical function associations in Lexical Functional Grammar (Mohanan 1994:199). FWs are relevant to argument structure and grammatical function structure, but irrelevant to grammatical category structure which is relevant to categorial (zero-level) words. This in turn means that the notion categorial and functional word do not necessarily converge. That is, one single functional word, i.e., a CP, may correspond to more than one categorial word (Mohanan 1994:235).

LFG assigns multiple-layered analyses/representations to the dual properties of analytic passives, and CPs in German and Hungarian. What is a word at one layer may be a phrase in another level, and each is subject to the specific rules and principles of the assigned layer/level. Thus, they explicitly separate rules and principles applicable at the level of categorial structure from those applicable to the levels of argument structure and functional structure, and from those at the level of constituent structure.

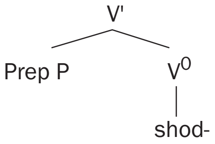
Clearly, the derivational account I pursue in this article excludes a derivation like that found in Figure 5 for the analytic complex passives in Persian. Assuming Figure 5b as the morphological structure of *shod-an* constructions in the lexicon, this structure must be opaque to syntactic derivation by the 'lexical integrity hypothesis'. This means the structures found in Figure 5c–d could not have derived from Figure 5b, and should be impossible since they violate the lexical integrity hypothesis according to which syntactic rules neither analyze nor alter word structure. Given the illicit direction of derivation in Figure 5 suggested for Persian analytic passives, I assume that I have been correct in proposing that Persian analytic passives are phrasal V's independently selected from the lexicon and formed through syntactic merge according to the simple and uniform principles of X-bar.

The alternative possibility I wish to pursue here is to assume that the type of syntactic structures I proposed for complex passive predicates in Persian may function as input to morphological operations/rules as in (29):

Now, assuming Figure 6b as the initial syntactic structure of *shod-an* constructions, as I did in Figure 1, we have to consider the plausibility of any of the structures Figure 6c–f as the lexical/morphological output of the syntactic input in Figure 6b.

A structure like Figure 6c where a phrasal category, YP, is dominated by a head is assumed to be impossible (cf. Ghomeshi 1996 and Lieber 1992.)

Figure 6d is the base-generated X^0-adjunction suggested by Ghomeshi & Massam (1994) for Persian CPs. Ghomeshi (1996), however, rejects this analysis of Persian CPs given that the parts of CPs separate by inflectional suffixes and other constituents. Ghomehsi, however, is not concerned with the morphological prop-



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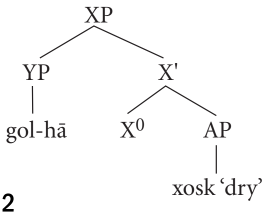

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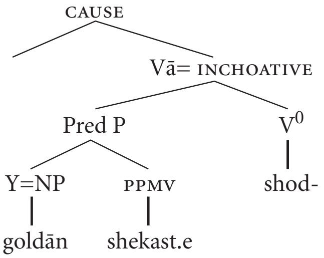

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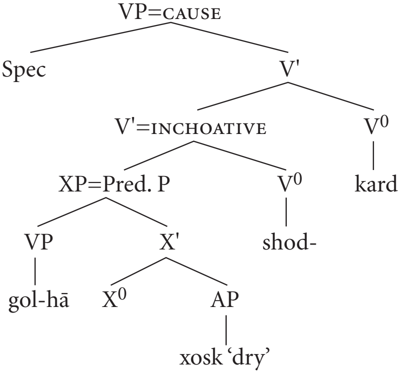

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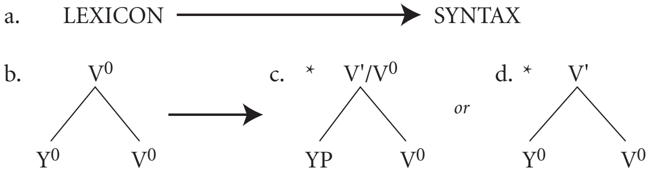

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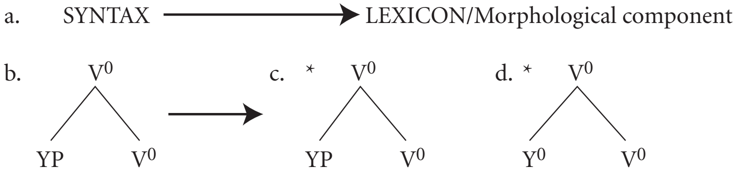

6

Figures 1–6. Tree diagrams.

erties of Persian CPs. I believe Figure 6d is a potential structure for *shod-an* verbal constructions, but empirical and concrete evidence is needed to justify the derivation of Figure 6d from 6b.

In Figure 6e two adjoined heads are dominated by a phrasal category, V'. Such a structure has been suggested to be theoretically impossible since two heads can be dominated only by another head (cf. Heny & Samiian's 1991 analysis, who argue for such an analysis of some compound verbs in Persian).

I believe that Figure 6e is a too strong a deviation from the syntactic relation sanctioned by natural languages. It is not clear what the status of V' dominating two heads would be, and how a phrasal node would take part in derivational and inflectional processes. I consider Figure 6e and 6c to be impossible syntactic and morphological structures, inappropriate for Persian analytic passives.

Figure 6f is is the incorporation structure where the head of a complement phrase adjoins, in a syntactic head to head movement, to its governing head (Baker 1988). Baker's theory of incorporation does not sanction a separate, independent level of morphological component, and much of inflection and derivation are done independently of lexicon through the syntactic computation.

Figure 6f can also be taken as a possible account of the morphological properties of Persian analytic passives. However, as Figure 6 indicates, I assume that incorporation is done at a post-syntactic level of morphology/lexicon.

In Chomsky's minimalist program (1995) as well, contrary to his previous works, all morphology is done at a separate level, but certain morphological features are checked in syntax.

So far either of the structures found in Figure 6d and f can be taken as a possible representation for the morphological properties of Persian analytic passive constructions. It seems that Persian data strongly favor an independent level of lexicon, or morphological component/structure. However, the status and position of such a level within the overall theory of grammar is an important issue in need of careful investigation.

Persian analytic passives with *shod-an* seem to indicate that morphology can be done post-syntactically as well, and the interface between lexicon and syntax may be both before, and throughout, syntactic derivation up to spell-out and after syntax (cf. Halle & Marantz' 1994 theory of Distributed Morphology).

In the structure of grammar that my theory suggests, lexical formations and morphological derivations can happen both before and after syntax. The post syntactic morphology inherits much of the syntactic hierarchical structure, independently formed by the syntax and performs further morphological derivations specific to the X^0 level lexical items. That is, I do keep a division of labor (at least partly) between lexicon and syntax, and I attribute computations and derivations of X^0 vs. X', X'' constituents to different levels of analyses. Yet Persian data such as (23) and (13) clearly indicate that a morphology/lexicon interface with syntax can be both before and after (and perhaps throughout) syntactic derivation. In any case syntactic relations constitute a major property of the lexicon and morphology.

In sum, considering the types of syntactic structure I suggested for Persian analytic passives with *shod-an* (Figures 1 and 2) in all instances the head of the Pred P counts as the direct object, or complement of the head verb *shod-an*. Submitting such syntactic trees to a post-syntactic morphology, then a simple instance of incorporation by which the head of the pred-P adjoins to the head of *shod-an*, as in (29f), provides us with a synthetic X^0 morphological compound that can account for all those productive and transparent morphological derivations with *shod-an* in Persian.

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* * *

DEVERBAL NOUNS WITH POSTMODIFYING PREPOSITIONAL PHRASES

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It has often been pointed out[1] that deverbal nouns (nouns derived from their corresponding verbs, with or without suffixation) often require complements[2], as the following example shows.

(1) The second development was *the election in September 1978 of a Polish Pope*. (Thatcher 1995:371)

This construction has at least two characteristic properties. One is that most complements in this construction are *of* prepositional phrases. The second is that prepositional phrases denoting time and place often cut into the more immediately connected phrases of deverbal noun and complement phrase. I shall focus on the second point in particular, briefly referring to the first point.

For this purpose, I have collected all the 100 examples to be analyzed from my readings of various sources. While I am concerned with the analysis of this construction in present-day English, I shall pay attention to the construction in 18th and 19th century English, to see whether or not such a construction was already used in earlier periods.

1. previous studies. Quirk et al. (1985:1290) discuss the co-occurrence of deverbal nouns with postmodifying phrases, showing degrees of awkwardness as follows (slightly modified).

(2) ? the(ir) arrival for a month
(3) ? the(ir) behaviour with courtesy
(4) * the(ir) contribution out of kindness

They comment as follows:

> It appears that adjuncts relating to duration, manner, or cause are awkward or inadmissible as postmodifiers. Deverbal nouns… might be described as mere records of an action having taken place rather than as descriptions of the action itself.

But as I discuss later, prepositional phrases relating to time and place in particular are admissible as postmodifiers. These phrases agree with the nature of deverbal nouns.

Webster (1977) also discusses the ordering of prepositional phrases as follows:

(5) ? Reorganisation by the civil servants of the machinery
(6) Reorganisation by the civil servants of the machinery for their salary negotiations

She considers the length of prepositional phrases to be a determining factor. She further comments that locative and temporal prepositional phrases occur most naturally, which, incidentally, agrees with my observation.

From slightly different perspectives, Hopper and Thompson (1984:738) give three types of argument structure with nominalizations as follows.

(7) Susan's arrival
(8) the introduction of leavened bread
(9) his discussion of breads

They comment that the (8) type (one argument) is far more frequent than the (9) type (two arguments). Most of my data contain only (8) type nominalizations.

Fries (1999) discusses the following patterns of complement structure in relation to relative information.

(10) the reluctance *of some to accept his own unsupported testimony*
(11) a very moving appeal *to all Christians to do all they can*
(italics are Fries's)

The structure consisting of deverbal noun + prepositional phrase + *to* infinitive was found in my data as follows:

(12) *Our failure in the 1960s to consider* as an alternative government where… (Thatcher 1995:140)
(13) …witness *a partly unconscious decision by the government to base* the administration more than ever… (Anderson: 149)

But in this paper I have excluded this kind of structure from the discussion, partly because this structure differs slightly from the one I am discussing.

Regarding teminology, the term 'nominalization' is often used to include both deverbal and de-adjectival nouns (i.e., *kind = kindness*) on the basis of their systematic morphological correspondence. The functions of deverbal nouns and de-adjectival nouns, in this respect, are similar to each other. I shall, however, be concerned with the functions of deverbal nouns in this paper. As regards the functions of nominalization, see Quirk et al. (1985:1288–92) and Francis (1989).

	Pattern	Number of Occurences
a.	*the* +(adj.) + N + time prepositional phrase + *of*	41
b.	*the* + (adj.) + N + place prepositional phrase + *of*	20
c.	*the* + (adj.) + N + agent prepositional phrase + *of*	12
d.	poss + time/place prepositional phrase + *of*	4
e.	other	23

Table 1. Pattern frequency[3].

Also as regards genres, nominalizations are often used in written language. Chafe (1982) mentions that the uses of nominalization as a device for detachment and of sequences of prepositional phrases characterize written language.

2. ANALYSIS AND DISCUSSION. First of all, look at the patterns of this construction in my data. As Table 1 shows, the most frequent pattern is '*the* + deverbal noun + time + *of*', and the next most frequent patterns are '*the* + deverbal noun + place + *of*' and '*the* + deverbal noun + *by* NP + *of*'.

The following are some representative examples of each pattern.

(14) *the* + (adj.) + N + time prepositional phrase + *of*:
  a. Yet another was *the attempted assasination in 1878 of the police chief, General Trepov*. (Bullock: 32)
  b. …eventually led to *the foundation in 1978 of the European Democratic Union (EDU)*. (Thatcher 1995:340)
  c. *The bombing at dawn of the previous day of the nuclear engineering plant at Al Qubai*, so cunningly disguised that… (Forsyth: 448)

(15) *the* + (adj.) + N + place prepositional phrase + *of*:
  a. The early 15th century also saw *the development in England of a school of* predominantly religious music. (Hindley: 97)
  b. …*the growth in Russia of the Posolski…* Prikaz and… (Anderson: 241)
  c. …*the existence in these early languages of certain very similar terms* relating amongst other things to ritual and religion… (Renfrew: 250)

(16) *the* + (adj.) + N + agent prepositional phrase + *of*
  a. …in the run-up to *the expected ratification by the US Senate of the treaty*. (Thatcher 1995:245)
  b. …a result of *the crushing by its rulers of any social institution…* (Anderson:380)
  c. …but a device which allows *the handling by the individual of symbolic concepts* and… (Renfrew: 274)

(17) possessive + N + time/place prepositional phrase
  a. I had successfully persuaded President Regan in the course of *our discussions in Washington of the importance of attending the Cancun summit…* (Thatcher 1995:168)
  b. *…his abrogation in June 1789 of the Jayeuse Entree of…* (Anderson: 202)

(18) other
  (a) *…a translation into Gothic of the Bible*, made in the fourth century A.D., parts of which still survive. (Renfrew: 68)
  (b) *…saw the establishment on a hitherto unknown scale of the practice of creating…* (Anderson: 126)
  (c) …caused *a Protestant anti-Irish reaction even in 1865 against the party* which seemed more closely identified with the Irish. (Blake: 111)

The preposition attached to a deverbal noun is identical to that found with the corresponding verb, such as *react against* = *reaction against, participate in* = *participation in*, and *resign from* = *resignation from*. In this case, unlike those of *of*, the deverbal noun does not often take *the*, which partly explains that the noun often takes either no article, the indefinite article or plural number. That is, other prepositions than *of* weaken the restriction of modification of the deverbal noun.

As regards the order of prepositional modification, Jespersen (1961 V: 68–72) discusses subject and object order in nexus-substantives with reference to prepositions:

(19) S (possessive) + *of* + O
our rare admission of strangers
(20) S (pos.) + preposition (other than *of*) + O
his resemblance to my confessor
(21) S (with *of*) + O (with *of*) …very rare
(22) S (with *of*) + O (with some other prepositions)
the hatred of Hyde for Jekyll
(23) S (with *by*) + O (pos.)
his expulsion from power by the Tories
(24) S (with *by*) + O (with *of*)
the accidental discovery by Miss Knag of some correspondence
(25) S (with *by*) + O (with some prepositions other than *of*)
a monstrous arrogance that could not tolerate any approach to her by others

Jespersen's data are old and are not based on frequency, and therefore are different from my results.

Francis (1989:205) discusses a function of nominalization as encapsulation of given information which often serves as departure of point in the discourse. This

	Position	Number of Occurences
a.	object position	41
b.	subject position	20
c.	complement position	12
d.	past participle + prep + DN	4
e.	other	23

Table 2. Positional frequency of deverbal nouns.

statement gives the expectation that a deverbal noun is accompanied by the definite article and demonstratives.

From the viewpoint of information structure, it is generally known that the end position of a sentence contains new information, often with lengthy NPs. This is often called a principle of end-focus or end-weight. Wales (1989:318) states that 'new information most commonly occurs towards or at the end of an utterance (end-focus)'. In the same vein, Quirk et al. (1985:1357) also say:

> 'it is common to process the information in a message so as to achieve a linear presentation from low to high information value. We shall refer to this as the principle of END-FOCUS.'

From these statements given above, it is expected that a prepositional phrase complement with a long range of modifiers come at the end of a sentence. The reason for the frequency of time and place prepositional phrases is that, first of all, these phrases often co-occur with verbs, and consequently verblike nouns (i.e. deverbal nouns), and that the in-between position of time and place adverbial phrases is appropriate in the flow of discourse, introducing more informative parts towards the end of a sentence.

While deverbal nouns often become subjects, many deverbal nouns of this construction come after the verb. Table 2 shows the positional frequency of deverbal nouns in my data.

It turns out that deverbal nouns are placed towards the end of sentences. Categories (d) and (e) include the following examples.

(26) The pronoun choice was clearly motivated *by the predominance at the time of women teachers*, a situation which led… (Baron: 175)
(27) I had successfully persuaded President Reagan in the course of *our discussions in Washington of the importance* of attending the Cancun summit which was held that October in Mexico. (Thatcher 1993:168)

The subject position is fairly frequent, and this is mainly explained by the fact that the subject is in old information position[4] and that the deverbal noun used in that position often serves the function of linking the sentence to the previous one(s), as in example (28). From time to time, a deverbal noun appears in subject position with new information, but that deverbal noun is turned into an old information noun, as in example (29).

(28) Rapid and forcible integration of conquered territory with that of the conqueror at any level, religious, economic or social, was exceptional. Certain political and fiscal obligations had of course to be accepted by the newly acquired area; but they did not as a rule involve any drastic change in its social organization. Thus, for example, *the conquest by Russia during the great Northern War (1700–21) of the Swedish provinces of Livonia and Esthonia* had little influence on society in these areas. (Anderson: 34)

(29) *A control by landlords of the life of their own localities as complete as that in England or Prussia* can be seen in many other parts of Europe. In Hungary and Poland *this control* was absolute, unchallenged and unchallengeable. (Anderson: 54)

So far I have discussed the structure of deverbal nouns with postmodifying prepositional phrases from the perspective of end-weight informativeness. But from a different perspective, I should briefly look into the possibility of reduction of postmodification by prepositional phrases (cf. Quirk et al. 1985:1274).

The example given before, repeated here, can be considered as omission of a verb phrase, as in,

(30) [≈ (1)] The second development was that the election of a Polish Pope took place in September 1978.

A prepositional adverbial phrase usually co-occurs with a dynamic verb. Because of its verbal nature, a deverbal noun, which is different from an ordinary noun (e.g., *boy*), is allowed to co-occur with a prepositional phrase of time and place, but the cooccurrence is economically based and slightly condensed. In this elliptical construction, more emphasis is placed on the recording of an event including time and place than the happening of the event. What kind of verb should be supplemented depends on the deverbal noun.[5]

Finally with regard to this construction in the 18th and 19th century English, I examined approximately 50,000 words of each in Adam Smith's *The Wealth of Nations*, and George Berkeley's *Principles of Human Knowledge* and *Three Dialogues* as 18th century data, and John Stwart Mill's *On Liberty and Other Essays* and Charles Darwin's *The Origin of Species* as 19th century data. I found only two examples of this construction in 19th century English as follows.

(31) In the modern world, the greater size of political communities… prevented *so great an interference by law in the details of private life…* (Mill : 18)

(32) *We see this in the recent extension over parts of the United States of the species of swallow having caused the decrease of another species.* (Darwin : 127)

Because of the scarcity of examples, we cannot tell to what extent this construction was prevalent in Late Modern English. More data should be collected to confirm the trend.

3. CONCLUSION. I have discussed deverbal nouns with postmodifying prepositional phrases in terms of information structure and have demonstrated that sentence parts are not randomly arranged, but meaningfully placed in sentences according to communicative purposes. Generally speaking, given/old information comes first, and new information comes late. The structure of postmodification of deverbal nouns as central accords with this flow of discourse. I also hinted at the possibility of analysis of the postmodification structure as reduction of a verb phrase. As regards the older stage of this structure, more data will be needed.

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[1] I am grateful to Laurel Brinton, Peter Robinson and anonymous reviewers for reading and commenting on an earlier version of the present paper.

[2] The 'complement' in this paper refers to any completing function of prepositional phrases.

[3] This group shows heterogenous patterns not included in the types given above, with a variety of meanings.

[4] In this paper, given/old information and new information have been taken for granted. For detailed discussions on this topic, see Lambrecht 1994:43–50 and Wales 1989.

[5] Usually, omission suggests several possibilities, but in the case of the deverbal noun construction when a verb is retained, it seems that a low content verb is most prototypical.

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* * *

LINGUISTIC DATA AND ITS USES: THE PROBLEM OF CONFLATING 'DATA' AND 'EXAMPLES'

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This paper focuses on three issues surrounding the concept of 'data' in linguistics. The first is the essential nature of data as perceived by those working in the fields of 'theoretical' (TL) and 'applied' linguistics (AL) respectively. The second is how this data is used in published studies—to 'empirically verify' or to attempt to 'falsify' a hypothesis. The third concerns key underlying assumptions about the relationship between prediction and observation (and the failure to make these assumptions explicit). I will be examining all three issues with an eye to how each is involved with the overall problem of conflating 'data' and 'examples' in theoretical linguistic investigation, a problem not found in applied linguistics, nor, for that matter, in any other social sciences, nor in the natural sciences.

While Coleman (1998) performed a statistical analysis of lexical items identifying elements of the research process in TL and AL corpora, this paper focuses exclusively on qualitative aspects of sample texts drawn from the same corpora. The TL corpus of Coleman (1998) consists of all main section articles from volume 67 of *Language* (*L*), and the AL corpus, of all main section articles from *TESOL Quarterly* (*TQ*) volume 25. These 14 articles (over 217,000 words) from *L* and 24 articles (over 159,000 words) from *TQ* are all from 1991 and comprise over 377,000 words in all. In this paper, I will further explore some key issues surrounding linguistic data and its uses in TL and AL by looking at examples from one article from each corpus. I have selected for illustrative purposes the first article in each corpus which can be regarded as an example of so-called 'primary research': Aristar (1991) and Hudson (1991).

1. the essential nature of data in tl and al. According to previously-reported corpus-based research (Coleman 1997b, 1998), *data* refers to quite different things in theoretical and applied linguistics (TL and AL, respectively). TL writers tend to use the term to refer to something whose source is not explicitly identified, while AL writers almost always identify the sources of their data (and this source is essentially never the AL writers themselves). TL writers typically refer to things as *data* if they are example sentences (supposed tokens), cited forms (types), or even analyses of the same. The data of AL writers almost always consists of recorded observations of others' actions (recorded speech, questionnaire responses, and so on).

Shown in Figures 1–3 are examples of things referred to as *data* by Aristar (1991). Figure 2 shows only part of Aristar's Table 1 (ibid:10); the missing section—actually most of the table—is indicated by a row of four asterisks. For clarity, because I have

(7)	*minu-n*	*kanssa-ni*
	1 sg-GEN	with-my
	‘with me’	

Figure 1. Item referred to as ‘data’ in Aristar (1991: 7).

Family	Language	Relative Clause Marker	Genitive Marker
Nilo-Saharan:	Anywa	*mana/mo*	sg. *ma-r* pl. *mo*
	Luo	*ma*	sg. *ma-r* pl. *mo-g*
	Lotuxo	m.sg. *ǫllǫ*	*ǫlǫ*
*	*	*	*

TABLE 1. Genitive and relative comparative morphology.

Figure 2. Item referred to as ‘data’ in Aristar (1991:10).

(15)	Bilin:	’aqwa ja’ag-na-x^{w}
		water drink-1 pl.-m.REL
		‘water which we do not drink’

Figure 3. Item referred to as ‘data’ in Aristar (1991:12).

included any item numbering given in the source as part of the ‘data’ example, I have enclosed figures inside boxes.

Aristar clearly includes the item shown in Figure 1 when he says, ‘The Finnish ***data*** show very clearly that the ordering of such adpositions is almost purely a function of the source from which the adposition derives…’ (ibid:7). He identifies the material in Figure 2 as ‘data’ when he begins the paragraph below it, somewhat curiously, ‘Since the ***data*** in the table are unanalyzed…’ (ibid:10). (I say ‘curiously’, since the table shows phonemic transcriptions of previously-isolated morphemes.) Aristar identifies his item (15)—shown in Figure 3—as ‘data’ on p. 15 when he refers collectively to it and other items as ‘[t]he Agaw ***data***’. (Boldface italics in each case are mine, of course.)

The sources of these are only secondarily identified, at best—for example, that of his item (7) as ‘Anderson 1983:43’ (ibid:6) and that of his item (15) as ‘Hetzron 1969, 1976:30’ (p. 12). The source of the material shown in his Table 1 (shown only in small part in Figure 2 above) is nowhere identified.

(18) a. *'aqwa ja'ag-na-γʷ-əl*
water drink-1 pl.-m.REL-to
'to water we do not drink'
b. *ti'idad adäri-γʷ-əd*
order lord-m.GEN-DAT
'by the order of the lord'

Figure 4. Item referred to as one containing 'examples' in Aristar (1991:13).

Next, I would like to consider some 'examples' identified as such by Aristar. On p. 7, he says the following: '…Spanish *detrás de* and *Arabic bi-jaanibi* 'beside'—one could enumerate ***examples*** such as this at considerable length.' He goes on to say, 'I have found ***examples*** of the partitive derivation, however, only in Finno-Ugric'. He also introduces his item (18)—given in Figure 4—by saying '…as the Bilin ***examples*** 18a-b show' (ibid:13).

Two things are of particular note here. First, as originally mentioned in Coleman (1997b), the same kind of thing is referred to at one time as *data* and at another, as an *example*. In fact, some of the same items are referred to in different places on a single page (p. 7) as '[t]he Finnish ***data***' and '***examples*** of the partitive derivation… in Finno-Ugric'. Given the earlier statistical analysis done on the larger TL corpus of Coleman (1998), this is not by any means idiosyncratic to Aristar (1991). It is fairly typical of the TL corpus. In contrast, no such conflation of 'data' and 'examples' is found anywhere in the AL corpus (see below).

Second, there is the issue of to what degree Aristar's 'data' (or 'examples') constitute anything which should be labelled as 'observations' in the sense in which scientists use the term. We should regard not only Aristar's description of the material in his Table 1 as 'unanalyzed *data*' with some skepticism, but also that such as is shown in Figures 1, 3, and 4. What he is calling *data* is not merely a recorded utterance (if any of it in fact was ever a *recorded utterance* at all) but, *at the very best*, that plus an accompanying phonemic and morphemic analysis. The confusion of many linguists over what constitutes an 'observation' in a scientific sense has been brought up again and again over a period of decades. There are a number of arguments as to why a linguist's own intuitions about grammaticality, structural descriptions, and analyses do not count as 'observations' in the scientific sense. Not the least of these is what introductory texts in social science research design call 'researcher bias' or 'experimenter bias' (Plutchik 1968; Johnson & Solso 1971; Brown 1988; Hoover & Donovan 1995). For some enlightening examples of linguists discussing the broader issue of what constitutes 'observation' and 'data' in our field, see Itkonen (1978, 1981), Wunderlich (1979), Ringen (1980), and Yngve (1986, 1996).

Hudson uses the term *data* only once, then to refer to summary statistics which aggregate subjects' responses to the test items in his study (they are means and standard deviations found in his Table 1, Hudson 1991:93).

> …An example is the following:
>
> 3. An ____ microcomputer application is data acquisition and analysis. A general purpose…
>   (a) unknown
>   (b) awful
>   (c) open
>   (d) excellent

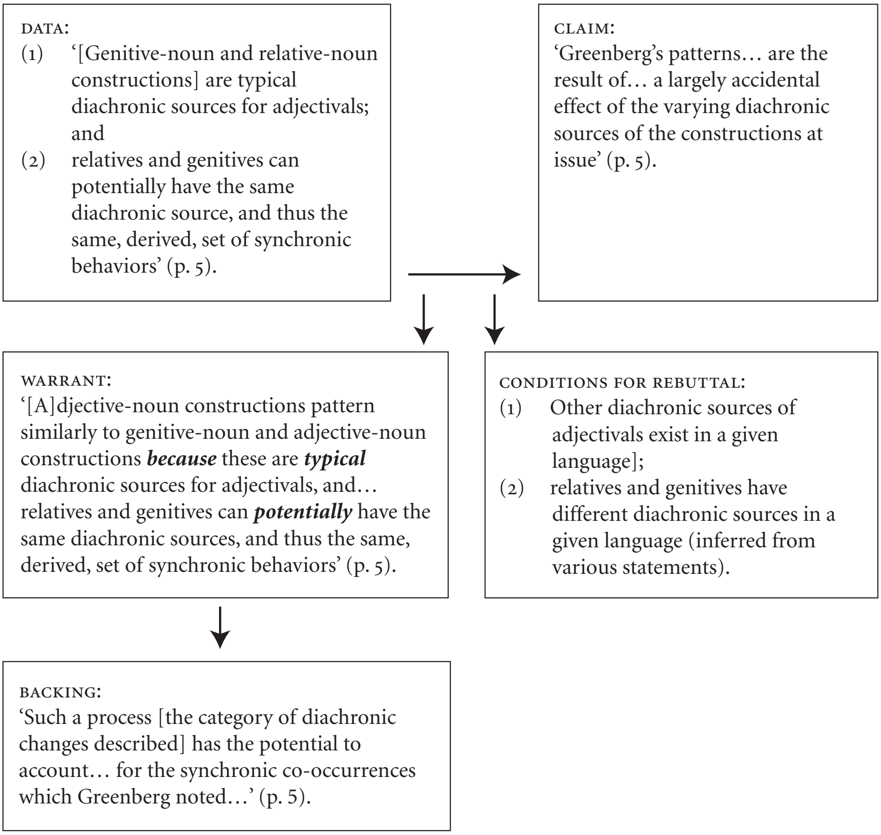
Figure 5. Reference to an 'example' in Hudson (1991:92).

He uses the term *example* in a completely different way: to illustrate elements of his experimental treatment and data-collection instruments. Figure 5 shows one such use.

The fact that Hudson (in typical AL fashion) distinguishes these two things which Aristar (in equally typical TL fashion) conflates is critical, as I will explain later on.

2. THE USES OF DATA IN TL AND AL. Discourse-based research going back over a quarter century (among the earliest being Botha 1970 and Wunderlich 1979) has examined quite a number of case studies. It shows that TL writers tend to attempt to structure their arguments much like logical 'proofs', using a 'data' / 'warrants' / 'conclusions' format as described by Toulmin (1964). Botha (1970), for example, uses Toulmin's framework to analyze the argument structure of Lakoff (1968) in great detail. I will use it to show the layout of Aristar's (1991) main line of argument. I will also show that the same kind of analysis of argument structure can be applied to texts in AL as well, using Hudson (1991) as an example. However, a key difference will become apparent between the TL and AL argument structures, particularly in terms of their uses of data.

Toulmin's (1964, pp. 94 ff.) scheme identifies the following major elements of argument structure (he has more than one label for some, so I have chosen in each case one as applied by Botha 1970): data, claim, warrant, conditions for rebuttal, and backing. See Figure 6, which I have produced to show the structure of Aristar's (1991) main argument. The 'data' in this schema is 'the facts we appeal to as a foundation for the claim' (Toulmin 1964:97). A 'warrant' is a general, hypothetical statement which can act as a bridge 'and authorize the sort of step to which our argument commits us' (p. 98). It may contain one or more 'qualifiers' (identified in Figure 6 in bold italics) which in turn suggest the condition(s) of rebuttal (ibid: 100–01)—in the warrant of Aristar's main argument, these are the terms 'typical' and 'potentially'). The 'backing' consists of 'other assurances', '[s]tanding behind our warrants… without which the warrants themselves would possess neither authority nor currency…' (ibid:103).



DATA:
(1) ‘[Genitive-noun and relative-noun constructions] are typical diachronic sources for adjectivals; and
(2) relatives and genitives can potentially have the same diachronic source, and thus the same, derived, set of synchronic behaviors’ (p. 5).

CLAIM:
‘Greenberg’s patterns… are the result of… a largely accidental effect of the varying diachronic sources of the constructions at issue’ (p. 5).

WARRANT:
‘[A]djective-noun constructions pattern similarly to genitive-noun and adjective-noun constructions ***because*** these are ***typical*** diachronic sources for adjectivals, and… relatives and genitives can ***potentially*** have the same diachronic sources, and thus the same, derived, set of synchronic behaviors’ (p. 5).

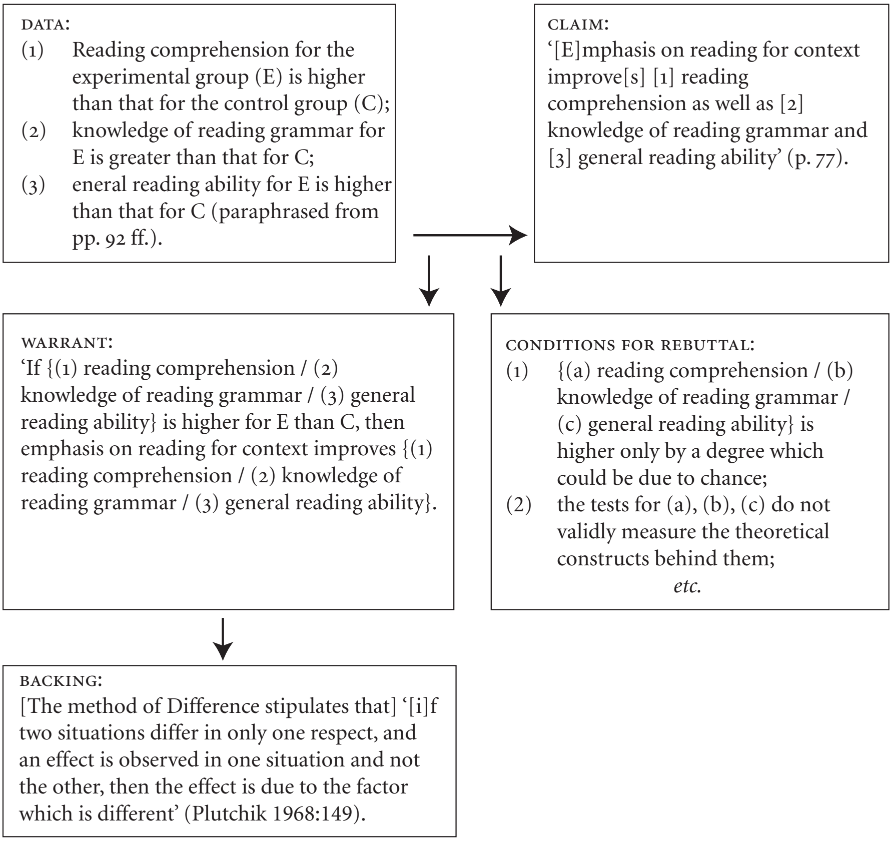
CONDITIONS FOR REBUTTAL:
(1) Other diachronic sources of adjectivals exist in a given language];
(2) relatives and genitives have different diachronic sources in a given language (inferred from various statements).

BACKING:
‘Such a process [the category of diachronic changes described] has the potential to account… for the synchronic co-occurrences which Greenberg noted…’ (p. 5).

Figure 6. Aristar (1991) main argument structure (scheme of Toulmin 1964).

A few striking differences emerge as a result of a comparison of the two argument structures (Figures 6 and 7). However, I will focus on only one at the moment. This is the relationship of the data to the claim as expressed by the warrant. For each sub-hypothesis (claim) of Hudson (1991), [1]–[3] in Figure 7, there is implicitly a complementary ‘null hypothesis’ used in his statistical tests. The tests are therefore designed to yield counter-evidence if such is available (Popper 1962; explained briefly in Knight 1989:63–64, 139–41). This is typical in AL. In contrast, Aristar’s TL argument uses data in a wholly different fashion. He uses it as what Botha (1973:35) refers to as ‘confirming evidence’, which

> [i]n Rescher’s [1958] terminology… ‘establishes’ a hypothesis… If the predictions [of the hypothesis] are borne out by the evidence, it is said that the evidence ‘confirms’ the hypothesis.



DATA:
(1) Reading comprehension for the experimental group (E) is higher than that for the control group (C);
(2) knowledge of reading grammar for E is greater than that for C;
(3) eneral reading ability for E is higher than that for C (paraphrased from pp. 92 ff.).

CLAIM:
'[E]mphasis on reading for context improve[s] [1] reading comprehension as well as [2] knowledge of reading grammar and [3] general reading ability' (p. 77).

WARRANT:
'If {(1) reading comprehension / (2) knowledge of reading grammar / (3) general reading ability} is higher for E than C, then emphasis on reading for context improves {(1) reading comprehension / (2) knowledge of reading grammar / (3) general reading ability}.

CONDITIONS FOR REBUTTAL:
(1) {(a) reading comprehension / (b) knowledge of reading grammar / (c) general reading ability} is higher only by a degree which could be due to chance;
(2) the tests for (a), (b), (c) do not validly measure the theoretical constructs behind them;
etc.

BACKING:
[The method of Difference stipulates that] '[i]f two situations differ in only one respect, and an effect is observed in one situation and not the other, then the effect is due to the factor which is different' (Plutchik 1968:149).

Figure 7. Hudson (1991) argument structure (scheme of Toulmin 1964).

Discussions of the role of 'empirical evidence' in TL over past decades are consistent with this assessment of the nature of Aristar's use of *data*. For example, Chomsky (1978) gives the case—as he imagines it—of an astronomer whose theory of some astronomical phenomenon is challenged:

> 'True, you have presented a theory that explains the available evidence, but… how do you know that your theory is true?' The astronomer could respond only by repeating what he has presented; here is the evidence available and here is the theory that I offer to explain it. (p. 202)

To make sure there is no misunderstanding, I quote what he says on the following page (203):

> We then try, as best we can, to devise a theory of some depth and significance… testing our theory by its success in providing explanations for selected phenomena.

In other words, there is evidence, and a theory that 'fits' the evidence is supported by that evidence.

Now, as Popper has argued for some time (see Popper 1962), the key difference between science and philosophy ('metaphysics') is the use of data to provide potential falsification in the former and the use of data to establish logical 'proofs' in the latter. This is not, as some have claimed, an attempt by Popper to establish a 'program' for science. Rather, it is a generalization he has made based on observation of how science and philosophy each operate on a day-to-day basis. AL writers tend to rely strongly on statistical methods which require the formulation of hypotheses to be stated in potentially 'falsifiable' form. The 'rule of the game' in AL is thus to obtain data that is likely to include counter-evidence if such evidence exists. The corresponding 'rule of the game' in TL, as explained by Chomsky (1978) and as exemplified in Aristar (1991) is to find evidence that 'supports' or 'confirms' a hypothesis.

The confusion of 'example' and 'data' in TL is connected to this. In the AL corpus, examples merely *exemplify*. That is, AL examples have a positive function limited to explanation; they are not involved in establishing the correctness of the hypothesis. AL data has an implicitly negative function: it is involved in attempting to falsify a hypothesis. The confusion of 'example' and 'data' in TL is possible only because TL data is in fact used in a positive function, to exemplify a claim and thus persuade a reader of the correctness of the claim. Those still unconvinced should read Aristar's own words, which appear as the backing for his argument—see Figure 6.

3. UNDERLYING ASSUMPTIONS ABOUT THE RELATIONSHIP BETWEEN PREDICTION AND OBSERVATION IN TL AND AL. The differences in the uses of *data* in TL and AL are associated with (unspoken) underlying assumptions about the relationship between hypotheses and observations. Both the TL and AL communities would agree, for example, that deviations between hypotheses and observations should be *small* and *random*. However, recall that those in TL use as data cited forms. These are typically not tokens corresponding to individual concrete observable 'real-world' events, but most often are generalized *types*. Thus, when a 'single counterexample' is found in TL, it is usually not a single conflicting observation at all, but a type, or entire class of observation tokens, yielding not a small, random deviation from prediction (in the form of a single 'event'), but a substantial, patterned class of deviations.

Consider this in light of the TL use of data in the confirmation of claims vs. the AL use of data in their falsification. In AL, any significant departure of observation from prediction—in raw frequency of observations or in terms of observed *types*—'falsifies' the claim. In TL, data is used to support a claim, and the importance of patterned deviations from prediction (the occurrence of types in contradiction to prediction) is permitted to be explained away more easily. How so? Recall the conflation of 'examples' and 'data': thus an example representing a *type* of deviation from prediction (actually a whole class of observable deviations) is treated as a single item of observed data.

4. CONCLUSIONS. In sum, the dominant rhetorical mode of TL is to devise a theory which *fits the data*, while that of AL is to follow the major rhetorical pattern of the sciences, in which a hypothesis (the so-called 'null hypothesis') is to be *falsified by the data*. Obviously, I am arguing for a shift in the TL paradigm with regard to what *should* constitute linguistic 'data' and how this 'data' should be used. If, as Yngve (1996) suggests, theoretical linguistics aspires to be a science rather than a branch of philosophy, we must do two things. We need to end once and for all the practice of conflating 'data' and 'examples'. In addition, we need to use data according to standard scientific practice: in the attempted falsification of hypotheses, not as 'confirming evidence'.

If we are satisfied to be philosophers of language, then we can continue as we have. There is nothing inherently wrong with that. But for TL to be useful to those involved in areas such as language teaching, natural language processing, and other fields in which we need to 'get things done' with language, a stronger connection needs to be made between the claims we make and observations of people actually communicating. And that connection needs to be according to the uses of these observations (data) in standard scientific practice: in the testing of claims (attempted falsification of hypotheses).

Introductory textbooks tend either to state or imply that TL is scientific in its approach, e.g., it is 'the science of language' (Macaulay 1994:3), 'scientific inquiry into human language' (Finegan 1994:13), or characterized as 'scientific' (O'Grady et al. 1997:xxiii). I have heard a few colleagues argue that even if TL differs from 'the other sciences' in foundational ways, this is fine, because there is 'no reason all science has to work in the same way'. In response, I close with the following, with apologies to Lewis Carroll (see Gardner 1960:268–69):

> 'You're holding it upside down!' someone interrupted.
>
> 'To be sure I was!' Prof. Dumpty said gaily. 'That's science for you!'
>
> 'I don't know what you mean by "science",' said another.
>
> But the Professor smiled contemptuously. 'Of course you don't—till I tell you. I meant "there's a nice knock-down argument for you!"'
>
> 'But "science" doesn't mean "a nice knock-down argument",' yet another objected.
>
> 'When I use a word,' Dumpty said, in a rather scornful tone, 'it means what I choose it to mean—neither more nor less.'

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MULTIPLE FUNCTIONS OF *WHEN*-CLAUSES IN DISCOURSE

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This paper studies adverbial clauses in English that are headed by the subordinating conjunction *when*[1]. While it is the lexical item *when* that is in focus, the study extends beyond the lexicon to the whole clause within the scope of the conjunction. The *when*-clause position relative to the main clause is an important issue since its function sometimes varies depending on its position, whether preposed or postposed to the main clause. Thus the study deals with the order of clauses in the sentence. Also relevant is the position in the paragraph and discourse structure of a sentence with a *when*-clause. For example, paragraph- or discourse-initial *when*-clauses are found to introduce the topic.

This paper attempts to describe the multiple functions of *when*-clauses in different types of discourse found in magazines, newspaper articles, and short stories. It shows that in addition to providing the temporal situation, preposed *when*-clauses contribute to textual cohesion by linking sentences together, while at the same time demarcating higher-level boundaries like episode. Postposed *when*-clauses, in contrast, tend to provide semantically crucial information rather than contribute pragmatically to text organization.

When-clauses generally indicate the temporal situation of the event that the main clause describes, but they may also convey some other interclausal relation with the main clause. With illustrations from naturally occurring discourse, the paper presents cases in which there is an additional logical relationship such as causal, conditional, or concessive. It addresses the question of why *when* is used in these contexts rather than the explicitly logical conjunctions like *because*, *if*, and *although*.

1. AN ILLUSTRATIVE PASSAGE. To bring our research questions to focus, let us look at the following three short paragraphs from an article entitled, ‘Benefits that improve our lives—for life’. There are two preposed and two postposed *when*-clauses (WCs) below:

> (1) (a) {**When** President Thomas Jefferson negotiated the Louisiana Purchase in 1803…} critics said it was too expensive. Imagine if Jefferson had shared this shortsighted view. Imagine if he had looked only at the bottom line. We might be a very different nation. Likewise, (b) {**when** it comes to programs that serve people, like Social Security and Medicare}, we must consider more than just the dollars and cents.
>
> While working, we contribute to Social Security and Medicare so we and our families can receive benefits (c) {**when** we become eligible}.

(1) Yet many Generation-Xers (born from 1965 through 1976) doubt they will ever receive Social Security and Medicare benefits. Many in the Boomer generation (born 1946 through 1964) are not sure they will be able to collect either. Understand that some of those who are now receiving benefits once expressed similar doubts (d) {**when** they were young}.

The first example, (1)a, presents a topic for the main clause of the sentence; in fact, a topic for the next three sentences of the paragraph. It also provides a setting or situation for the main clause event. The second example, (1)b, is also topic presenting, which is made clear by the semi-frozen expression, ***when** it comes to*, which could be replaced by the typical topic presenter *as for*, as in *Likewise, as for programs that serve people…* This sentence presents the topic of the whole article, which deals with Social Security and Medicare, even though it occurs in the middle of the same initial paragraph referring to Jefferson. Juxtaposed to a historical fact regarding the Louisiana Purchase, (1)b skillfully presents the topic of the article. Notice both examples of the WC are preposed to their main clauses, and both serve to present a topic.

The remaining two WCs are postposed. These postposed WCs sharply contrast in their discourse function with the first two preposed ones. The postposed WCs do not present a topic for the main clause or for the paragraph or discourse. The scope is narrower and restricted to that of its own main clause. The first, (1)c, specifies the circumstance of when we can receive benefits (***when** we become eligible*). The information in the WC here is background information—though new—that is conditional to the benefit. It is sort of a reminder to the reader relating to the preceding main clause. The last example, (1)d, is similar in giving background information: *some of those who are now receiving benefits once expressed similar doubts {**when** they were young}*. Their doubts would have been expressed prior to their receiving benefits, not now at their older age but when they were young. Similarly to (1)c, the WC relates to its main clause only.

Now let us look at the semantic relationship of these WCs to their respective main clauses. The first, (1)a, is encoding an event that occurred at a prior time to that of the main clause; people criticized Jefferson after he did the negotiation. The second, (1)b, has no temporal relationship; its sole function seems to be that of topic presentation in the organization of text. Although it does have the clausal structure with the verb *comes*, it is hardly the case of a separate propositional statement that can be related to the main clause (*we must consider* . . .). The third, (1)c, may be interpreted as conditional as well as temporal; that is, we can receive benefits only if and when we become eligible. The temporal relation may be considered as prior time to the main clause event time since one first needs to become eligible before receiving benefits. This illustrates the case of a WC expressing both temporal and logical (conditional) relations. The final one, (1)d, may not be interpreted as encoding a logical relation; it encodes a temporal relation only. But it does not encode a prior time relation as in the first example, but a concurrent time, since while they were young they would have expressed doubts.

The text in (1) illustrates different functions of the WC depending on their positions, and different semantic relations of the WC depending on their context, whether temporal only (prior or concurrent time), or both temporal and logical (conditional). As in the case of (1)b, its function might be textual only with no temporal or logical relation.

2. PREPOSED VS. POSTPOSED *WHEN*-CLAUSES. A number of studies have pointed out functional differences between preposed and postposed adverbial clauses in English (e.g., Chafe 1984, Thompson 1985, Ramsey 1987, Givón 1990, Ford 1993, and Hwang 1994). Most of them report broad text-organizing functions of preposed clauses (hence their frequent occurrence at paragraph-initial positions), and local functions of postposed clauses. The WC examples in (1) confirm the general functional distributions. The WCs in (2) present slightly different situations.

> (2) The ring was one of my favorites. To anyone else it would have seemed relatively worthless, but to me the little silver ring with the red and green stones held much sentimental value. I was 12 years old (a) {**when** my cousin left it with me}. For the next few years it constantly reminded me to pray as I watched him run from God. But (b) {**when** he re-dedicated his life to God's service} it became a constant reminder to me that prayer works!

As for the semantic relation between the main and WCs, (2)a implies a concurrent time (temporal overlap) of a span-event type, i.e., during the time that I was 12 (a span of time), my cousin gave me a ring (an event). (2)b signals a prior time, that is, after the re-dedication, it became a reminder to the author. There is also a causal relation in that his re-dedication caused it to become a reminder that prayer works.

The clause (2)a is postposed, but it seems to carry more crucial information than the main clause, which simply states the author's age. (2)b, which occurs in the last sentence of the paragraph, is not presenting a topic although it is preposed. After the contrastive conjunction *but*, (2)b presents a new, contrastive situation that happened before the one stated in the main clause. The WC in (2)b is very closely tied to the immediately preceding clause in content, marking a contrast: *as I watched him run from God* and *when he re-dedicated his life to God's service*, the only two clauses mentioning God. Within the sentence itself, the WC provides a situation that enables the event encoded in the main clause. Are these two WCs then counterexamples of the conclusions regarding preposing and postposing drawn from (1)? I would rather suggest that these two display secondary functions of WCs in each position. The first, (2)a, we may refer to as a skewing from the normal pattern for a special effect, and the second, (2)b, as a back-referencing function of tying two sentences closely together[2].

In (2), after the initial two sentences introducing the ring, the eventline starts with the third sentence that contains a WC. While it is more common (like a rule of thumb) for the main clause to encode eventline information in narrative, it may be skewed for special effects. The main clause presents nonevent, setting information and is followed by a dependent clause encoding an event. Note, however, that it conforms to another general rule of English, namely, having the essential new information later in the sentence.

We may change the sentence to conform to the normal rule of encoding events in main clauses. The alternative sentences are given below as (3)a and (3)b with the preceding and following sentences to show the context.

(3) To me the little silver ring… held much sentimental value.
a. {**When** I was twelve years old,} my cousin left it with me.
b. My cousin left it with me {**when** I was twelve years old}.
For the next few years it constantly reminded me to pray…

The WC in (3)a is now providing a setting ('my age') in which the event in the main clause took place, which is the usual way of encoding narrative information. However, (2)a which is found in its original text is more interesting due to the adoption of skewing from the normal coding pattern. The third possibility, shown in (3)b, gives the information on age in the postposed WC. The main clause information about my cousin seems a bit abrupt without the transitional information about my age that places the event at some distance in the past. Thus each of the three possibilities seems to have a slightly different focus although they are the same in semantic content and interclausal relation[3].

The sentences in (4) illustrate postposed WCs encoding events after a main clause giving setting information (often at the beginning of discourse or episode). Notice that if the status of the main clause and WC is reversed in these examples, conforming to the normal rule of encoding events in the main clause, there will be no special effect created at the beginning. Additional examples of postposed WCs for dramatic effects are in (5).

(4) a. Day had broken cold and gray, exceedingly cold and gray, {**when** the man turned aside from the main Yukon trail and climbed the high earth bank . . .}.
b. The next evening, the Princess and the King were eating dinner {**when** they heard a splashing and a plopping on the front steps}.

(5) a. It seemed to Hans as if all eyes were fixed on him {**when**, in an agony of fear, he timidly placed the red apple on the plate}.

(5) b. There he laid it gently on the grass, {**when** suddenly the snake coiled, rattled and leapt, biting him on the leg}.

We may propose the following functions, primary and secondary, for preposed and postposed *when*-clauses in discourse (cf. Hwang 1994). The secondary functions may be viewed as derived from their primary functions, but distinct enough to be considered separate.

(6) **Preposed *when*-clauses**: Primarily serve thematic, orienting, and cohesive functions, marking the boundary at the higher, global level. Secondarily serve a back-referencing function at the local level, closely tying two sentences together.

Postposed *when*-clauses: Primarily serve a semantic function, giving a greater integration with the main clause at the local level. Secondarily function to create a special effect for an unexpected turn of events significant at the global level (often marking the climax).

Next we focus on the interclausal relation that holds between the WC and the main clause; first, a temporal relation only (sec. 3) and then a conflation of temporal and logical relations (sec. 4–6).

3. TEMPORAL RELATION ONLY. The prototypical, unmarked relation of a WC to the main clause is a 'prior time' temporal. The WC provides a general idea of time, and it is used when it is not important to convey exactly which type, whether prior time or concurrent or subsequent. These subtypes are often identifiable only when we analyze it closely. But the overwhelming majority of examples show that prior time is basic.

3.1. PRIOR TIME ('AFTER' NOTION). This is the canonical semantic relation of the information in a WC to that of the main clause. What is encoded in a WC occurs prior to the event or condition stated in the main clause. A more precise marker of prior time would be the conjunction *after*, which, however, brings our attention to temporal sequence only and much too precisely. It does not serve the text-organizing function of a higher level as *when* does. In the story called *Ping* (with 57 sentences) only two WCs occur and they are both preposed.

(7) All night long Ping slept near the grasses on the bank of the river with his head tucked under his wing, and (a) {**when** the sun rose up from the east} Ping found he was all alone on the Yangtze River…

(b) {**When** Ping came up to the top of the water far away from the fishing birds,} he found little crumbs floating, tender little rice cakes which made a path to a house boat. As Ping ate these crumbs, he came nearer and nearer to the house boat.

Both WCs encode prior time relation and function cohesively to tie two events. What's expressed in (7)a is closely tied to the temporal adverb phrase (*all night long*) in the first clause and is predictable, the sun would rise the next morning after the night. (7)b occurs paragraph initially and ties this paragraph to the previous one which ends with the following sentence: *Swoop, splash, splash, the ringed birds were dashing here and there all about Ping, so down he ducked and swam under the yellow water of the Yangtze River*. We see the information in (7)b is largely predictable, since after Ping ducks and swims under water he would surface somewhere. (7)a occurs sentence internally and has a narrow functional scope within the sentence itself. On the other hand, (7)b has a larger scope of text organization.

In (8), the WC encodes prior time, but the time lapse between the two would be minimal; they are in very close succession, similar to *as soon as*: 'my fingers found the song **as soon as** they touched the keys.' Again, *when* conveys not the precise time but the general time in a loose way[4].

(8) …her most famous tune … 'It was the song my fingers found {**when** they touched the keys}', the singer told reporters, who heard the song while waiting outside.

3.2. CONCURRENT TIME ('WHILE' NOTION). Concurrent time overlap would normally be expressed by *while* or *as*, which has more durative sense of time span in the adverbial clause. As a more general marker of time, *when* is not directly pointing at concurrent time but allows other possible interpretations, such as prior time and conditional.

The examples in (9) from two different stories illustrate that WCs encode concurrent time, without leaving a possibility for prior time. The event in the WC in (9)a occurs during the time span 'he (the third little pig) was up in the tree'. In (9)b, the event in the WC may also be interpreted as subsequent to that of the main clause in that 'you already knew what I was **before** you picked me up'.

(9) a. He was up in the tree, picking apples, {**when** the wolf came along}.
b. 'You knew what I was {**when** you picked me up}', said the snake as it slithered away.

In the following, (10)a may be interpreted as concurrent time. But with its iterative meaning, it has the sense of *whenever*, a conditionality with a universal quantifier ('each and every time he's not tied up, he is writing'), or more broadly, that of *if*, a hypothetical condition. (10)b is a typical example with both temporal (prior time) and causal (*because*) meaning, which is dealt with in section 5.

(10) Stephen King is writing again at his home in Bangor, Maine, (a) {**when** he's not tied up with physical therapy}. Mr. King suffered broken bones and a collapsed lung (b) {**when** he was struck by a minivan…}.

In (11), from Lakoff and Johnson (1999:209–10), the temporal relationship might be of a concurrent type or immediate prior time ('as soon as'), and possibly there is a conditional meaning as well.

(11) {**When** you don't have enough iron,} you are anemic.
{**When** your heart stops beating,} you are dead.

The sentences in (12) occur initially in a one-page article and near the end of it respectively. The semantic relationship of the WCs is unclear between being prior time and concurrent time. They are also interpretable as conditionals, as *if/when* at the same time (see sec. 4), and as conditionality with universal quantifier, the notion of 'whenever'.

(12) (a) {**When** anthropologists get together}, they like to swap stories about the joys of their profession: trekking among the Masai in Northern Tanzania, combating queasy stomachs in Chiapas…
(b) {**When** you're looking at ethnic relations}, (c) {**when** you're looking at who is a traditional enemy of whom}, you can't just come out and say this is all academic.

See also the earlier examples (1)d and (2)a that are discussed to encode a concurrent time relation only.

3.3. SUBSEQUENT TIME ('BEFORE' NOTION). As already shown in (12b), WCs may also encode a subsequent time to that of the main clause happening.

(13) {**When** I moved to Florida} I got rid of all my winter clothes except a favorite brown-plaid coat.

This is the very first sentence of a short story. The WC presents setting information stating the location in which most events happen. If *before* were used to make the temporal relation of subsequent time clear since 'I got rid of the clothes before I moved', it would not perform the appropriate discourse level function of topic presenting. That may be why more texts start with a WC than with a *before*-clause.

As the above examples show, prior time is the most basic relation in WCs, but they can also express concurrent time and subsequent time. Next we take up the cases where the WC is interpreted as having not just a temporal relation but also a logical one.

4. TEMPORAL AND CONDITIONAL ('WHEN' AND 'IF'). Since conditionals are topics (Haiman 1978) and preposed WCs often present topics, it is not surprising to find examples of both conditional and temporal meanings realized in the same WC

simultaneously. But the conflation of temporal and conditional relations is found both in preposed and postposed *if*-clauses.

I once heard a colleague giving a message with several *if* and *when-clause*s, such as *I will join the organization* ***when*** *I master linguistics, …* ***when*** *I find the right partner, …if I have adequate support*. Then he grouped them together as *all these if's*, treating them all as hypothetical conditions. An excerpt of a text (*'What happens* ***when*** *the tardy run the school?'* by Laura Schlesinger) in (14) shows similar WCs which are interchangeable with *if*-clauses.

(14) The principal said, '. . . tardiness and truancy are hard to overcome {**when** students come from dysfunctional homes}.' So the solution is to permit the school to become equally dysfunctional. {**When** the children run the school by coming and going as they please}, that is exactly what they will get: a dysfunctional extension of the irresponsible chaos at home.

However, I wager the main concern of the administration was to avoid having one of these angry, dysfunctional parents sue the school {if and **when** one of their tardy offspring held up the pharmacy and got hurt in the process}.

All the *when*'s and *if*s are interchangeable in (15) also, which comes from Ann Landers column on January 1, 1999, giving a type of New Year's resolution. The examples in (16) are from a list of *when*-clauses following the heading 'You know you are in Texas', which appeared on the internet.

(15) Apologize {**when** you realize you are wrong}. An apology never diminishes a person. It elevates him. Don't blow your own horn. If you've done something praiseworthy, someone will notice eventually.

Lighten up. {**When** you feel like blowing your top}, ask yourself, 'Will it matter a week from today?' Laugh the loudest {**when** the joke is on you}.

Go to war against animosity and complacency. Express your gratitude. Give credit {**when** it's due}—and even {**when** it isn't}. It will make you look good.

(16) You know you're in Texas {**when** you can say 110 degrees without fainting}; {**when** you learn that a seat belt makes a pretty good branding iron}; {**when** the temperature drops below 95, you feel a bit chilly}…

The conflation of temporal and conditional relations in a given sentence is seen in 'contingency', which Longacre (1996:69–70) sets up as a distinct interclausal relation. It is 'a type of deep structure *if* notion which involves a temporal reference, i.e., an implicational relation and a temporal relation are here brought together in spite of the fact that normally these two sorts of relations are distinct from each other'. He includes the following examples originated from Ibaloi of the Philippines:

(17) Then I will marry, {**when** I have some money}.
Then you should plant, {**when** next April comes}.

In some languages, one marking may have several possible interpretations. A Guanano sentence, for example, with two clauses joined by switch reference suffixes (for the same or different subject) and otherwise with no conjunction may encode 'temporal or logical contingency ('when, if') and circumstance ('in that')' (Waltz 1976:26). The most plausible interpretation and translation among these three relations are dependent upon context.

Further, there are other languages, such as Indonesian, Vai (a Mande language of Liberia), and some languages of Papua New Guinea, that make no distinction between 'if' and 'when'-clauses, resulting in neutralization (Thompson & Longacre 1985:193). They state that 'the distinction between English *when* and *if* clauses is simply one of degree of expectability'. Thus it is not surprising to find WCs with both senses, temporal and conditional, resulting in interchangeability. But the choice between the conjunctions *when* and *if* signals different degrees of expectation; that is, the event is more highly expected to occur in a clause with *when* than with *if*.

5. TEMPORAL AND CAUSAL ('WHEN' AND 'BECAUSE'). WCs can be used to encode both 'when' and 'because' notions simultaneously, which is not possible with the conjunction *because*. A temporal sense is strong in the next example, but either concurrent or prior time is possible depending on how one understands 'being hit by a cold snap'. Is it an event at a given point in time or is it a span of time? If the former, then the WC is prior time; if the latter, concurrent time.

(18) One day {**when** we were hit by a cold snap} I pulled it [the coat] out.

The two postposed WCs in (19) have a strong causal sense, providing the reason why the interview was cancelled.

(19) The *Today* show scrapped a long-scheduled upcoming interview with… Flockhart {**when** it was told that the actress didn't want any questions put to her about her weight}. Ms. Flockhart was slated to appear Monday on the top-rated morning show. But those plans came to a screeching halt {**when** the actress's representatives demanded that she not be subjected to questions about her weight or speculation that she might have an eating disorder}.

Many examples of this type are found in the book *You Can't Be Too Careful*, by David Pryce-Jones, some of which are in (20)[5].

(20) a. A cocked pistol stuck in the belt of … shot him dead {**when** he slammed his car door on it}.
b. A fifty-two-year-old Frenchman was killed {**when** the automatic doors of a train closed on his neck in a Paris suburb}, police said.
c. A county hockey player died {**when** he fell on his stick as he played a league game}.
d. A businessman was killed {**when** lightning struck the metal zipper on his trousers} while he was playing golf . . .
e. Nine people were killed {**when** a television set exploded, starting a fire and natural gas blast…}

These examples are in a newspaper headline style (Jordan 1997), with an indefinite subject in the main clause and then giving the cause of death in a WC[6]. The main clause is devoted to provide the information that someone was killed, while the subordinate clause gives the cause of death. The cause is what is more interesting—the strange ways in which people died. Sequencing of the two clauses is not iconic, i.e., normal time order is reversed.

6. TEMPORAL AND CONCESSIVE ('WHEN' AND 'ALTHOUGH'). It is not common to find examples in which temporal and concessive meanings are conflated. Often the concessive part is not very obvious but detectable on close inspection. Three examples of this type follow:

(21) I didn't take the chance {**when** it was given to me}.
He failed to kill an enemy {**when** he had a golden opportunity}.
He won the race {**when** all odds were against him}.

7. CONCLUSION. The conjunction *when* is a general temporal subordinator and is more natural when imprecise coding is called for. Among temporal markers, *when* is preferred over *after* or *before* when the exact temporal sequencing is not in focus. These other subordinating conjunctions may be overly precise in such context, focusing on the sequential or simultaneous nature too much.

Dooley (1999:221) argues that much of human communication is a matter of degree and involves 'non-categorical (nonspecific, general) interpretations' in addition to 'categorical (specific)' ones. I suggest that *when*-clauses serve a non-categorical and general temporal function, especially when coupled with their discourse level functions such as presenting a topic.

The adverbial clauses with *when* prototypically mark a temporal relation, and specifically a prior time, but they may encode other temporal relations like concurrent or subsequent time. They may also express a logical relation, such as condition, cause, or concession, in which there is a fusion with the temporal notion.

[1] I am grateful to Marlin Leaders and Clyde Whitby for their valuable comments on the paper.

[2] Marlin Leaders has suggested that the fronting of the WC in (2)b may be to mark a contrast between the two clauses in the inner structure of a chiasmus.

[3] It is interesting to note that the conjunction *while* does not work here although it is the prototypical conjunction for temporal overlap; *while* expresses a span of time for its own clause.

a. *I was 12 years old while my cousin left it with me.
b. *While I was 12 years old my cousin left it with me.
c. While I was sleeping, a terrible thing happened.
d. *I was sleeping, while a terrible thing happened.

[4] The WC here occurs after a cleft-construction. See Declerck (1996) for a detailed discussion of all types of *when*-clauses, including nominal and relative clauses.

[5] I express my thanks to David Mead for providing me with many examples of this type and for a helpful discussion.

[6] In these cases, conjunctions like *during*, *while*, and *as* may not be used to indicate a causal relation; they express a temporal one only, as shown in c.

a. John died **when** he was struck by lightning while he was playing golf.
b. John died while he was playing golf **when** he was struck by lightning.
c. *John died **when** he was playing golf while he was struck by lightning.

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SPEAKERS' JUDGEMENTS ABOUT THE LEXICAL COMPLEXITY OF *NI*

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Since the early 1980's, network models have been proposed as cognitively inspired models of lexical representation[1]. Underlying these network models has been the assumption that most linguistic expressions, be they single lexical items or complex syntactic constructions, are polysemous (e.g., Lakoff 1987, Langacker 1991a/b, Goldberg 1995). In a network model, categories are assumed to be organized with respect to a prototype. Category members, represented as nodes, are connected directly or indirectly to the prototype through links brought about by processes of semantic extension, thus forming a highly interconnected structure with a center and periphery. By postulating multiple nodes connected to each other through chains of extension, network models can capture the fine-grained knowledge which speakers have about the conventional usages of a lexical item.

However, as argued by Sandra and Rice (1995), Rice (1996), and more recently, Croft (1998), these polysemy models are usually devised solely on the basis of the introspective judgments of the analyst. To best determine the proper representational model, any proposal should be attested by psycholinguistic evidence or the intuitions of actual speakers who are theoretically naive.

In this paper, a semantic network model is evaluated against empirical data from speakers' judgment tests. My focus is on the different senses of the Japanese particle *ni*, which I have argued to be a highly polysemous and semantically complex grammatical item (Kabata & Rice 1997, Kabata 2000). Based on data from a series of psycholinguistic experiments, I demonstrate that speakers may indeed perceive the centrality or peripheralness of senses as well as differential semantic distances between individual sense types. In Section 1, I present a network model for *ni* which has been proposed to account for its semantic complexity. I then discuss the results of three experiments designed to test certain features of the model, and follow up with a general discussion.

1. a semantic model for the japanese particle *ni*. Representative usage types of the Japanese particle *ni* are listed in Table 1 (overleaf). The direct complement of *ni* is underscored in each example. The corresponding elements in the English translation are treated accordingly.

Ni is associated with a wide range of usages, both semantically and syntactically. They vary from marking concrete spatial relations, such as location and destination, to more abstract ones such as result, purpose, and reason, as well as marking concessive relations between two clauses. Moreover, while some senses,

SENSE TYPE	EXAMPLE	ENGLISH TRANSLATION
LOCATION	*Kono heya* ***ni*** *piano ga ni-dai aru.*	There are two pianos **in** this room.
DESTINATION	*Taroo wa senshuu Tookyoo* ***ni*** *it-ta.*	Taro went **to** Tokyo last week.
RECIPIENT	*Taroo wa Masako* ***ni*** *hon o age-ta.*	Taro gave a book **to** Masako.
PASSIVE AGENT	*Taroo wa okaasan* ***ni*** *shikar-are-ta.*	Taro was scolded **by** his mother.
RESULT	*Taroo wa isha* ***ni*** *nat-ta.*	Taro became (ø) a doctor.
PURPOSE	*Taroo wa kaimono* ***ni*** *dekake-ta.*	Taro went out **for** shopping.
REASON	*Kono atsusa* ***ni*** *jitto shiteir-are-nai.*	I can't sit still **because of** the excessive heat.
CONCESSIVE	*Boku ga hantaishi-ta (no)* ***ni*** *kare wa it-ta.*	**Although** I opposed (it), he went.

Table 1. Representative usage types of the Japanese particle *ni*.

such as RECIPIENT and RESULT, can be characterized as GOAL-oriented, *ni* also conveys SOURCE-oriented senses, such as PASSIVE AGENT and REASON. I have identified 20 sense types for *ni* based on their image schemas and the semantic function exhibited by the complement of *ni*.

In Kabata (2000), I proposed a network model for *ni*, shown in Figure 1. In this model, which admittedly is far more complex than the handful of usages in Table 1 require, *ni*'s full range of senses are associated with particular semantic or content domains and the senses are interrelated, directly or indirectly, through metaphorical extensions and semantic similarity links. Following Anderson (1971) and Sweetser (1990), I have hypothesized that the most basic domain is the Spatial Domain, in which *ni* exhibits two related but distinct senses: the stative locative sense and the more dynamic ALLATIVE sense. These two basic senses have extended semantically across a variety of content domains (cf. Croft 1993).

In the Temporal Domain, *ni* serves as the all-purpose temporal marker in Japanese. This sense probably involves a simple semantic extension from the locative sense due to the pervasive TIME IS SPACE metaphor. In the Social Domain, *ni* marks a variety of senses which can be subsumed under 'dative': RECIPIENT, ADDRESSEE, and EXPERIENCER. Despite subtle semantic differences, they can be characterized as marking GOAL-oriented participants, much like its basic ALLATIVE sense in the Spatial Domain. In the same domain, however, *ni* also marks three distinctive relations (which I subsume under the 'experiencer as secondary agent' rubric) that are SOURCE-oriented: EXPERIENTIAL CAUSEE, PASSIVE AGENT, and HUMAN SOURCE. In the more abstract Conceptual/Perceptual Domain, *ni* diversifies further and takes on two opposing senses: CONCEPTUAL GOAL and CONCEPTUAL SOURCE. I have suggested that this semantic diversity stems from the ambiguity inherent in the (basic) directed path sense of *ni*: one end of the path marks a goal while the other end marks a source. In this mental domain, *ni* also introduces

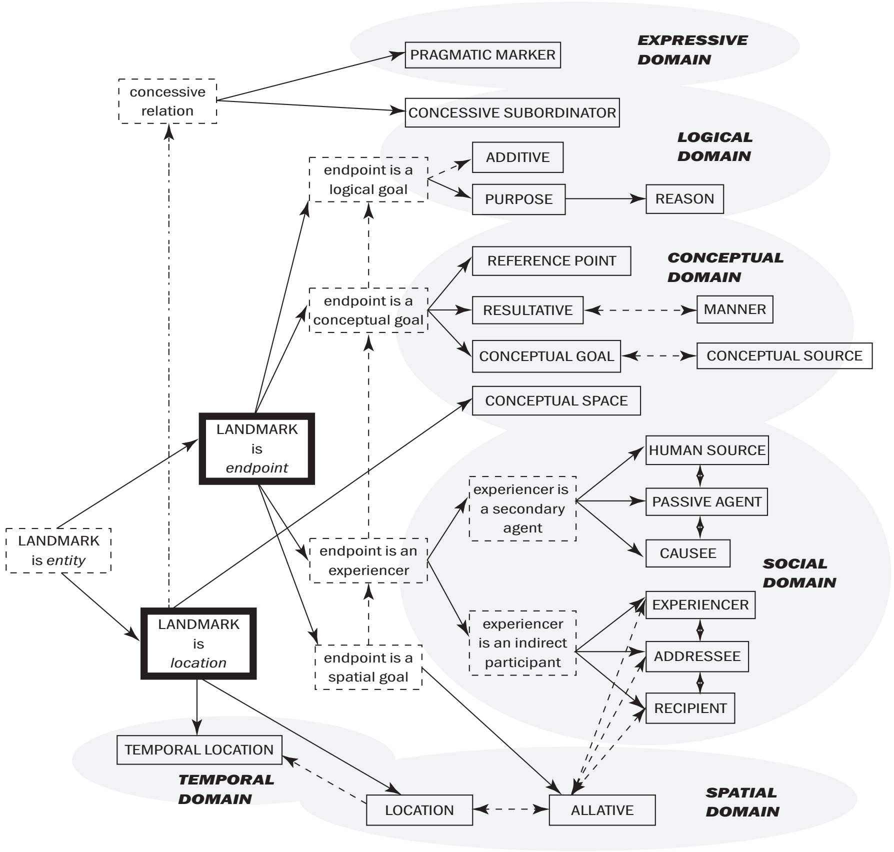


Figure 1. The correlation between frequency and order of mention.

RESULTATIVES, MANNERS, and CONCEPTUAL REFERENCE POINTS in comparisons or ratings. All of these can be construed as semantic extensions from the ALLATIVE. *Ni* also sets up a CONCEPTUAL REFERENCE SPACE or a setting for a conceptual state, which can be seen as an extension from the basic locative sense. Furthermore, in the Logical Domain, where propositional relations are described, *ni* marks two apparently opposite semantic relations: PURPOSE and REASON. CONCESSIVE CONJUNCTIVE and PRAGMATIC are related only remotely, although the historical records show a connection with the locative sense (Kabata 2000).

It should be emphasized that the network model characterized in Figure 1 is based on general tenets and tendencies of cognitive linguistic analyses of adpositions. It is only to be taken as a working hypothesis of the semantic structure of this particle. Whether speakers actually perceive such fine-grained distinctions between different senses of *ni* is an open, empirical question. Although there is no point in proving or disproving any specific model, we should be able to find evidence to

SENSE TYPE	SENTENCE PRODUCED	ENGLISH TRANSLATION
LOCATIVE	*Inu ga niwa* ***ni*** *imasu.*	There is a dog **in** the garden.
ALLATIVE	*Toronto* ***ni*** *ikitai.*	I want to go **to** Toronto.
RECIPIENT	*Ane* ***ni*** *okurimono o shimashita.*	I gave a present **to** my sister.
HUMAN SOURCE	*Oba* ***ni*** *purezento o moratta.*	I got a present **from** my aunt.
RESULTATIVE	*Atama ga masshiro* ***ni*** *narimashita.*	My hair turned (**to**) all grey.

Table 2. Sample sentences produced by subjects in Sentence Generation Task.

support central claims of the network models. Therefore, it was expected that certain senses of *ni* would be judged as more basic or central to the category, and that similarities between individual senses would be perceived to deferring degrees. Since senses are characterized in the model in terms of both image schemas and semantic domains, the degree of similarity between any single pair of senses should pertain to the similarity of the image schemas and/or the distance between the domains they are associated with.

2. THE PSYCHOLINGUISTIC STUDY. A series of psycholinguistic experiments were conducted to examine whether speakers' judgments about the various senses of *ni* actually accord with the proposed model. Three off-line tests were employed: a sentence generation test, a sorting test, and a similarity judgment test.

2.1. SENTENCE GENERATION TEST. A sentence generation test was conducted to determine which sense types of *ni* native speakers would produce more frequently. Following Rosch (1978), it was hypothesized that prototypical senses would be more easily recalled and therefore produced first and with the greatest frequency. Other sense types are also expected to be mentioned, but only with lower frequency. However, since *ni* is a homonymous morpheme, also meaning luggage, two, and resemble, it was also of interest to see which *ni* would be recalled more easily, a fully 'lexical' *ni* or the grammatical particle *ni*.

METHOD. 18 native speakers of Japanese, 11 female and 7 male, participated in this experiment on a voluntary basis[2]. Their ages ranged from 22 to 52, with the average age being 28. They were all residing in Edmonton, Alberta, at the time of the experiment, though they claimed to use Japanese on a daily basis. The subjects' task was to produce 10 sentences containing *ni* and to write them down on numbered index cards. Since there were 18 subjects generating 10 sentences, 180 sentences were obtained. I list some of the sentences they produced in Table 2.

RESULTS. Despite the distinct functions associated with the form *ni*, the first sentence produced by 15 of the 18 subjects contained the particle *ni*. Within the various usages of *ni*, by far the most frequent type produced was the ALLATIVE sense, followed by the other spatial sense, signaling a locative. ALLATIVE *ni* was the most

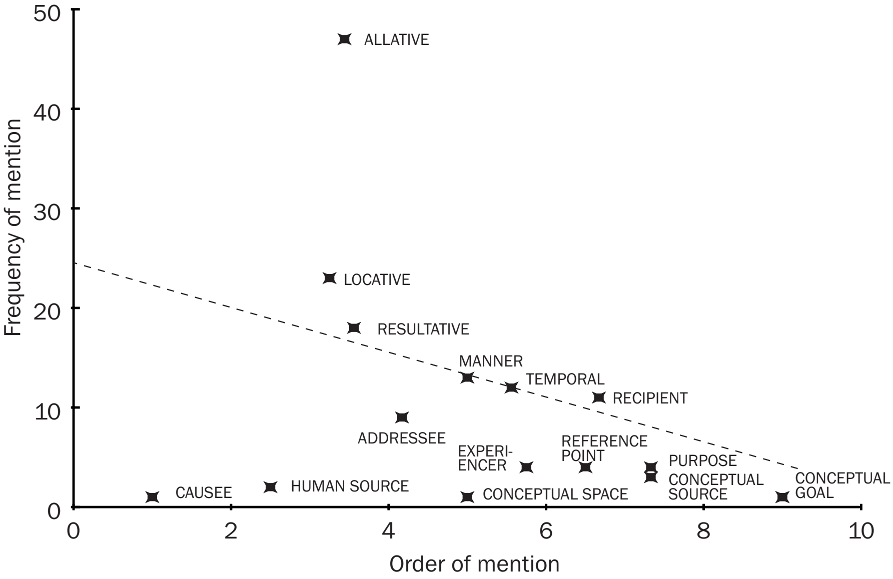


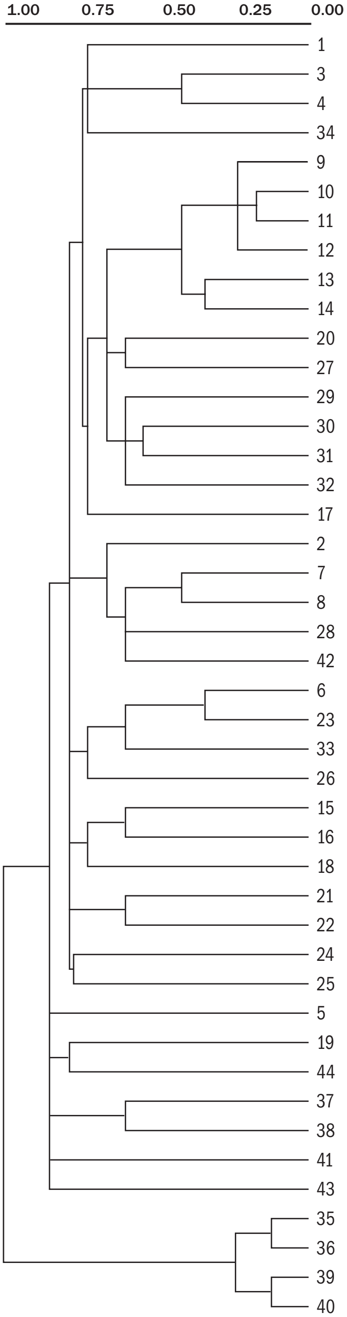
Figure 2. The correlation between frequency and order of mention.

frequent sense for 16 subjects. 12 of them produced it within the first three sentences. The more frequently produced senses were also generated earlier, although the (expected) negative correlation between frequency and order of mention failed to reach significance. However, when a single instance of CAUSATIVE *ni* was excluded, this correlation reached significance ($r = -.54$, $p < .05$).

Based on the assumption that high frequency of production is characteristic of prototypes, the results suggest that the two spatial senses are conceived as basic to the meaning of *ni*. The results also indicate that, in general, GOAL-oriented senses are more prevalent and therefore more basic than SOURCE-oriented ones. This finding is compatible with the proposed model.

2.2. SORTING TEST. The purpose of this test was to examine whether speakers perceive differing degrees of similarity between any two senses of *ni*. The logic behind this technique was that any response differences subjects make should reflect the distinctions they perceive. Likewise, the frequency with which a pair of senses are grouped together should indicate the relative similarity between them.

METHOD. Subjects were 18 native speakers of Japanese, 12 female and 6 male, all of whom were parents of students at two Japanese schools in Calgary, Alberta. Their ages ranged from 25 to 50 years old, with the average being 41.2. Stimuli consisted of 44 sentences containing *ni*. A pair of sentences for each of the 20 sense types as well as for complex particles and fixed expressions containing *ni* were obtained



SENTENCE #	SENSE TYPE	SENTENCE
1	[LOC]	Koonetsu de nekonda to iu hito ga achikochi **ni** iru.
3	[ALL]	Izure kokyoo **ni** kaette chichi no jigyoo o tsugu tsumori da.
4	[ALL]	Sugusama kamera o motte jiko no genba **ni** mukatta.
34	[PUR]	Eikokujin o manete, eri ga chijinda shatsu o shuuri **ni** dashita
9	[REC]	Anime ya gangu no seisakusha ga kodomo **ni** ataeru eikyoo wa ookii.
10	[REC]	Chiyooumi wa juuryoo shooshin go, ryooshin **ni** jisaku no shi o okutta.
11	[ADD]	Wain no tanoshimi o shuui no hitotachi **ni** tutaeteikitai
12	[ADD]	Kaijoo no hoka no shutsujoosha **ni** haroo to aisatsu o shita.
13	[CAUS]	Yuuseishoo wa zen shokuin **ni** keitaidenwa o motaseteiru.
14	[CAUS]	Konna hon wa kodomotachi **ni** yomaserubekidewanai.
20	[RES]	Doobutsu ga robotto **ni** henshinshite tatakau to iu stoorii de
27	[CGAL]	daigaku nyuushi sentaa shiken no mondai **ni** choosen shitemita
29	[CSRC]	Nanoka no kookoku 'Uchuu e ikoo' **ni** odoroita hito wa ooidaroo
30	[CSRC]	Sono mimoshiranu josee no yasashisa **ni** kangekishiteshimatta
31	[REA]	Mainichi no yukikaki **ni** tukare o uttaeru hito mo ooi to iu.
32	[REA]	Amari no ryookin no yasusa **ni** ushirometasa sae mo kanjita
17	[PAS]	Singuu-shi de wa choo ootubu no ame **ni** nandomo furareta.
2	[LOC]	Berusaiyukyuuden **ni** wa toire ga nakattasooda.
7	[EXP]	Shokuba wa kinen de, hebiisumookaa no watashi **ni** wa taihen turai.
8	[EXP]	Ningen **ni** wa iroiro kanoosei ga aru no da na to
28	[CGAL]	Furukutemo naganen kikonda irui **ni** wa aichaku ga aru
42	[CPLX]	Chichi **ni** totte yuiitsu no tanoshimi wa mago no kao o miru koto
6	[TEMP]	Girisya jidai **ni** mo infuruenza wa hayattasooda.
23	[CSPCE]	Ginkooman no kare wa kaigai no keizai jijoo **ni** mo kuwashii
33	[PUR]	Nihonkeizai no kurai muudo o fukitobasu **ni** mo kooka ga aru
26	[REF]	Ore wa kokyoo o aisuru kimochi de wa dare **ni** mo makenai
15	[HSRC]	'Tashika, sono mise wa heitensita hazu' to chijin **ni** kiita
16	[HSRC]	Torihikisaki no kaisha **ni** kurisumasukaado o moratta.
18	[PAS]	Musuko **ni** segamarete konpyuutaa o
21	[MAN]	Heya e haittemiru to musuko ga shizuka **ni** hon o yondeita.
22	[MAN]	Mono o taisetsu **ni** tukau eikokuji kishitsu ga arawareteiru no
24	[CSPCE]	Tennenshigen **ni** tonda kanada de wa denki gasu dai ga yasui
25	[REF]	Sooseisan yaku 6choo doru to beikoku **ni** hittekisuru keizairyoku da
5	[TEMP]	Nishirokugoo gasshoodan ga gogatsu **ni** saigo no ensookai o hiraku.
19	[RES]	Kare wa kanshyuu o tonikaku tanosii kibun **ni** sasetekureta.
44	[FIX]	Jibun de wa shoobushiteiru ki **ni** naru no dakara fushigi da
37	[ADD]	Shamisen o hiiteiru no wa nihongami **ni** kimono sugata no musume datta
38	[ADD]	Atsui nihonshu **ni** Shiokara to wa saikoo no kumiawase desu
41	[CPLX]	Kitazawasan no hanashi de wa akahige wa mo noyoo **ni** waitederu to iu
43	[FIX]	Mada neteiru kodomo o okosazu **ni** shitaku o shinakerebanaranai.
35	[COSV]	Danshi toshite todoketa no **ni**, kosekigakari ga joshi to
36	[COSV]	Ninki o hakushita no **ni** eiga wa kiraida to itteita.
39	[EXPR]	'Watashi wa icchakuba o karamasete katta no **ni**' to mata hozo o kanda
40	[EXPR]	Kokojaa yukimichi de subette hone o oru nante koto wa nai no **ni**...

Figure 3. Hierarchical clustering for 44 sentences containing *ni* from Sorting Task.

SENSE TYPE	#	TRANSLATION OF STIMULUS SENTENCES
LOCATIVE	1	There are people here and there who say they were bed-ridden because of high fever.
	2	I heard that there was no toilet in the Versailles Palace.
ALLATIVE	3	I plan to return to my home town and take over my father's business someday.
	4	I took my camera right away and headed to the accident site.
TEMPORAL	5	The Nishirokugo chorus is holding its last recital in May.
	6	I heard influenza was also prevalent in the Greek Era.
EXPERIENCER	7	The office is non-smoking, which is very hard on me, a heavy smoker.
	8	I thought that (ø) human beings have various potentials.
RECIPIENT	9	The influence that producers of animation or toys have on children is significant.
	10	Chiyonoumi presented his parents with his poem after his promotion to Juuryoo.
ADDRESSEE	11	I want to keep teaching the people around me the pleasures of wine.
	12	He greeted the other participants in the hall, (saying) "Hello".
CAUSEE	13	I heard that the Ministry of P & T has all its workers carry a cellular phone.
	14	We should not allow children to read such a book.
HUMAN SOURCE	15	I heard from a friend that the shop has closed down for sure.
	16	I received a Christmas card from a business partner company.
PASSIVE AGENT	17	In Singu-City, the heavy rain fell (=it rained heavily) on us many times.
	18	Being begged by my son, I bought a computer.
RESULTATIVE	19	He made us, the audience, feel pleasant anyhow.
	20	The story is that animals change into robots and fight.
MANNER	21	When I entered the room, my son was reading a book in a quiet manner.
	22	I guess this shows the nature of English people, who treat things with appreciation.
CONCEPTUAL SPACE	23	He, as a banker, is also familiar with the foreign economic situation.
	24	In Canada, which is abundant in natural resources, the electricity and gas fee is low.
REFERENCE POINT	25	With a total product of $6 trillion its economic power is equal to (that of) the u.s.
	26	I take a back seat to no one when it comes to love of my hometown.
CONCEPTUAL GOAL	27	I challenged the questions of the exam (made) by the Center for University Entrance Exams.
	28	Even if they are old, I am attached to the clothes I have worn a long time.
CONCEPTUAL SOURCE	29	Probably many people were surprised at the ad on the seventh (entitled) 'Let's go to Space.'
	30	I was moved by the kindness of the lady, who was a total stranger.
REASON	31	I heard many people complain about exhaustion from shoveling snow every day.
	32	[I] even felt guilty because the fee was so low.
PURPOSE	33	It has the effect of blowing away the Japanese economy's dark mood.
	34	Following the English, I sent some shirts out for repair whose collars had shrunk.
CONCESSIVE	35	Though I submitted the (birth) registration as a boy, an officer corrected it as a girl.
	36	Although [he] established his popularity (as a movie director), [he] was saying that he hated movies.
ADDITIVE	37	It was a young lady with a Japanese hair-do in a kimono who was playing *shamisen*.
	38	Hot Japanese *sake* and salty squid is the best combination.
PRAGMATIC	39	I got disappointed again and said, 'I bought [the ticket] which included the first-ranked horse'.
	40	Here, there is no such thing as slipping on a snowy road and breaking bones...(but people are exaggerating the situation).
COMPLEX	41	According to the story by Mr. Kitazawa, *Akahige** gushes out like seaweed.
	42	The only pleasure for my father is to see his grandkids' faces.
FIXED EXPRESSION	43	I have to do preparation without waking up the children who are still sleeping.
	44	It is strange because I start feeling as if I were competing.

Table 3. Translation of stimulus sentences. The *ni*-associated complement underlined. (**Akahige* is a kind of fish.)

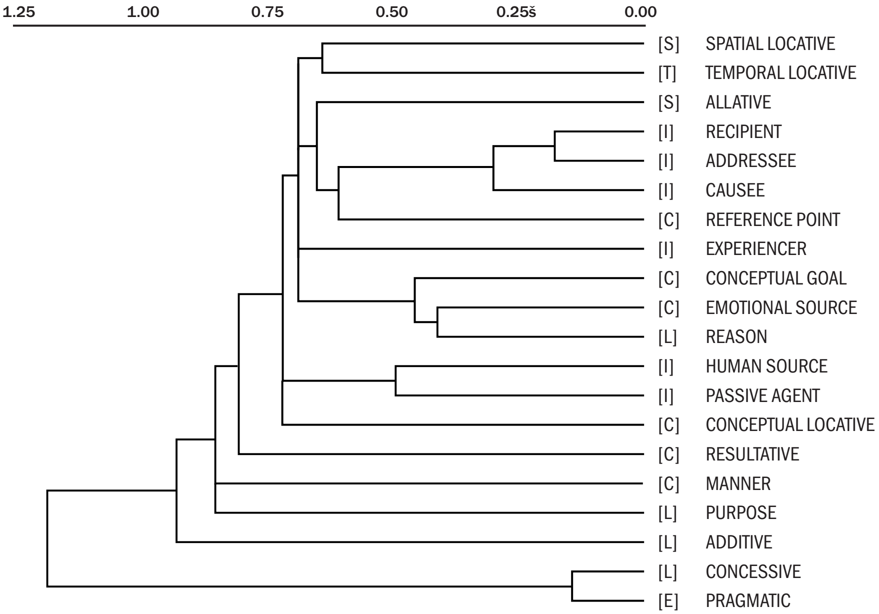
from the Asahi or Mainichi newspaper available on-line. Subjects were asked to sort the sentences on the basis of how *ni* was used in each of them.

RESULTS. A 44 x 44 similarity matrix, with scores ranging between 0 (very different) and 18 (very similar), was constructed based on the frequencies with which every possible pairwise combination of sentences occurred. The frequency data from the matrix were then subject to a hierarchical cluster analysis, a method whereby similarities between cases, reflected in the hierarchical structure of clusters, are computed based on the distances between every pair of cases. A tree diagram, shown in Figure 3, represents the output of the analysis. English translations for stimulus sentences are given in Table 3.

The results indicate that different senses of *ni* were judged as being similar to widely different degrees, as predicted from the model. CONCESSIVE CONJUNCTIVE *ni* (stimulus sentences 35 and 36) and PRAGMATIC *ni* (39 and 40) were perceived as being closely related to each other, but distinguished from other senses of *ni*. These are very abstract senses of *ni* and both serve a clause-combining function in Japanese. The GOAL-oriented senses of *ni* in the Social Domain, i.e., RECIPIENT (9, 10), ADDRESSEE (11, 12), CAUSATIVE (13, 14), formed a small cluster. SOURCE-oriented senses, such as HUMAN SOURCE (15, 16) and PASSIVE AGENT (17, 18), were combined into a larger cluster with sense types like MANNER (21, 22) and TEMPORAL (5), rather than serving as the core of a new cluster. Since centrality is one of the main characteristics of categorial prototypes, it was thought that certain types of GOAL-oriented senses (i.e., RECIPIENT and ADDRESSEE) may be perceived by subjects as more prototypical of the category. Surprisingly, the two spatial senses did not form a tight cluster, despite the semantic overlap they exhibit (Kabata 2000). Speakers must perceive as basic the distinction between these two senses.

Nevertheless, it may also be the case that subjects based their judgments on something other than the semantic characteristics of *ni*. Sentences 6 (TEMPORAL LOCATION), 23 (CONCEPTUAL SPACE), 33 (PURPOSE), and 26 (REFERENCE POINT) were judged as being similar, regardless of the semantic diversity in these uses of *ni*. Upon closer examination, it was found that these four sentences all contain the adverbial particle mo 'also,' right after *ni*. Lexico-syntactic context is hard to factor out, especially when one tries to use naturalistic sentences as stimuli, but it would have to be controlled for in any future study. Finally, a similarity judgment test was run in hopes of obtaining additional evidence for the goodness or weakness of the semantic network model proposed for *ni*.

2.3. SIMILARITY JUDGEMENT TEST. The rationale behind this test was that senses which are proposed to be semantically more related should be judged as being more similar. Since this technique requires subjects to compare only two sense types at a time and to make judgments based on a rather consistent decision criterion, it was expected to yield a result which, when assessed with the results from the other studies, would allow us to refine or reject the proposed model.



[S] Spatial Domain; [T] Temporal Domain; [I] Social (Interactive) Domain
[C] Conceptual Domain; [L] Logical Domain; [E] Expressive Domain

Figure 4. Hierarchical cluster analysis for senses of *ni* based on the results from Similarity Judgment Task.

method. The same group of 18 subjects from the sentence generation study participated in this experiment. 22 sentences, each representing a usage type of *ni*, were chosen out of the 44 stimulus sentences used in the sorting task by randomly selecting one of the two sentences for each usage type. The selected sentences were then exhaustively paired with each other to make a total of 231 sentence pairs, which were presented in random order. The subjects' task was to compare the two senses of *ni* in the paired sentences and to make similarity ratings based on usage on a ranked scale between 1 (totally different) and 7 (identical).

results. The similarity scores for the 231 sentence pairs ranged between 1.1 and 6.3, with the average being 2.53, which was rather low (indicating a bias towards judged dissimilarity). The concessive conjunctive/pragmatic pair got the highest similarity rating at 6.3, followed by the recipient/addressee pair at 6.2, the recipient/causee pair at 5.7, and the addressee/causee pair at 5.2. In contrast, the causative/pragmatic pair, the human source/pragmatic pair, and the passive agent/pragmatic pair all got the lowest similarity rating at 1.1.

The tree diagram in Figure 4 is based on the results of a cluster analysis of the data. The scores for sentences containing *ni* in a complex particle or fixed expression were excluded from the analysis because disparate lexical factors probably magnified the differences between the usage types. In accordance with the results of the sorting task, the concessive sense and the pragmatic sense were judged as being very different from the rest of the senses of *ni*. These remaining senses formed a large cluster, within which all of the individual sense were connected to one another at differing levels of the hierarchy. The two goal-oriented senses in the Social Domain, recipient and addressee, formed the first cluster. The causee sense, which is both goal-like and source-like in its meaning, joined the cluster, suggesting that these three social senses are perceived to be similar. Similarly, the reference point sense in the Conceptual Domain and the allative sense in the Spatial Domain formed a 'goal-like' cluster. However, other goal-like senses, such as resultative, manner, and purpose, were not judged as similar to more concrete goal-oriented senses.

2.4. discussion. Overall, the results from these experiments were consistent with the most important characteristics of the polysemy model. First of all, certain sense types were perceived as more central or prototypical to the category than others. The allative sense was by far the most frequently mentioned in the sentence generation test, suggesting that it may be more salient than other senses of *ni* in speakers' minds. The centrality exhibited by social goal-like senses, such as recipient and addressee, in the results from the sorting and similarity judgment tasks, suggests that *ni* may support more than one prototype.

The results also indicated that speakers do perceive degrees of similarity between senses. Moreover, the perceived similarity is based on the interaction between image schematic meanings and the background content domains, in accordance with the proposed network model. Senses that have similar image schematic meaning and are situated in the same content domain are perceived as being the most similar. The recipient, addressee, and causee senses were judged as being very much alike each other, and so were the human source and passive agent senses. The allative, reference point, and purpose sense, which share a goal-orientation, but not a conceptual domain, are perceived to be similar to the recipient and addressee senses, although to a lesser degree. The concessive and pragmatic senses are perceived as only remotely related to the rest of the senses, but as very similar to each other. After all, they both serve as abstract clause-level conjunctive markers and are associated with image schemas and content domains quite distinct from the other senses of *ni*.

3. conclusion. In this paper, I have shown that the semantic network based on a cognitive linguistic analysis can at least partially be supported by evidence from three psycholinguistic studies. Even though the actual network model proposed in Figure 1 may or may not reflect any individual speakers' perception of the various senses of *ni*, and the specific configuration of the model may be very much task- and context-dependent, the main characteristics of the model seem to be common to any models representing the semantic structure of *ni*. As such, the model can only have an abstract value, but it helps us better understand the nature of some

grammatical lexical units, such as dative markers and allative markers, which are notoriously polysemous cross-linguistically. A model like this should also have a pedagogical value. In future research, I would like to investigate whether and how the knowledge of semantic properties of particles and other grammatical items may enhance second language acquisition.

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COGNITIVE ANALYSIS OF *ZAI* IN MANDARIN CHINESE AND ITS USE THROUGH TIME

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In the study of the Chinese lexicon, the analysis of grammatical categories and their justification has caused a great deal of debate. It has been observed that, due to the lack of inflectional morphology and related characteristics in Chinese, lexical items do not show overt categorial distinctions, especially between verbs, adjectives and prepositions (Tai 1982). A good example of this would be *zai* 'to be/exist (in a place)', which was used as a verb in classical Chinese, but whose usage has now been extended to other categories such as coverbs/prepositions and adverbs. However, during this extension process, words that belonged to the same categories and have gone through similar changes have not developed at an equal rate (Li & Thompson 1974). Some have progressed less far than others in their developments and, thus, retain more original characteristics. Some verbs, for example, have developed into full prepositions, while others have legged behind and show more verbal characteristics in their present day usage (e.g., taking aspect markers). As a result, membership of grammatical categories is a matter of degree. These phenomena have caused difficulty in the classification of grammatical categories (Chao 1968, Chen 1978, Hashimoto 1971, Tai 1973, Teng 1975).

Based on these observations, this paper presents an alternative view of grammatical categories within the framework of Cognitive Grammar (Langacker 1987, 1991). The major points of the paper are illustrated through an analysis of *zai* as an example. The study is based on the theoretical assumption that linguistic knowledge is part of human cognition, which shows a prototype structure in conceptualization and categorization. The use of *zai*, as is demonstrated in the paper, displays the same pattern, i.e., with a prototype structure. The prototypical use of *zai* is as a verb, designating temporal relational predications. During the evolution of the language, its use has been extended to other functions designating atemporal relational predications and even nominal predications. The profiling of *zai* has also been expanded from the domain of space to the domain of time. Such extension from prototypical to non-prototypical categories is gradual, resulting in fuzzy boundaries among its different grammatical functions. The paper also shows that, although these characteristics of the Chinese lexicon cause difficulty for analyses using traditional approaches, they can be accommodated by the gradient notion of class membership in Cognitive Grammar. In the rest of this paper, Part 1 describes the use of *zai* in contemporary Chinese and the difficulty encountered by previous analyses, part 2 presents an analysis of *zai* within Cognitive Grammar, and part 3 is a summary.

1.0. USES OF *ZAI* AND PREVIOUS ANALYSES. This section presents the different uses of *zai* by using traditional terminology based on previous research. The difficulty encountered by earlier studies is also to be discussed. The focus of this section is on the uses of *zai* in contemporary Chinese.

1.1. AS A VERB. The original use of *zai* was as a verb, meaning 'to be/exist (in a place)'. This usage can be traced back to the 10th century B.C. (Shi 1986). (1) and (2) below are examples of this usage in contemporary Chinese:

(1) A: *Zhangsan zai ma?* B: *Zai.*
John ZAI Q-marker ZAI
Is John (here)? Yes, he is (here).
(2) *Ta zai wuzi-li.*
he ZAI room-in
He is in the room.

From (1), we can see that, when *zai* is used by itself (i.e., without a complement), it means 'to be in the place when and where the speech takes place'. 'Here' and 'now' are default values of the verb *zai*. Hence the translation 'is (here)'. In (2), *zai* is followed by a complement of location *wuzi-li* 'in the room'. Within the complement, *li* 'in' is a 'position word' following the noun *wuzi* 'room'.

1.2. AS A PREPOSITION/COVERB. *Zai* (with its complement) can also be used in a preverbal or postverbal position to designate location of the event indicated by the main verb. In such cases, *zai* is considered as a preposition or a coverb (further discussion to follow).

(3) *Ta zai wuzi -li chang ge.*
he ZAI room-in sing song
He is singing in the room.
(4) *Ta ba shu fang zai zhuo-shang.*
he BA book put ZAI desk-on
He put the book on the desk.

In (3) and (4) *zai* (with its complements) describes the location of the events. Generally speaking, a preverbal *zai* designates where the event takes place, whereas a postverbal *zai* indicates the location of an entity (subject or the object) as the result of the action (Please refer to Li & Thompson 1981 for further discussion of this point).

1.3. AS AN ADVERB/ASPECT MARKER. A third use of *zai* is to signal that an event is going on at a certain time.

(5) *Ta zai kan shu.*
he ZAI read book
He is reading a book/books.

In (5), *zai* indicates that the event of reading is in progress at the time of the utterance (the default value when the time reference is not specified). When *zai* is used this way it does not take a complement.

1.4. DIFFICULTIES ENCOUNTERED BY PREVIOUS ANALYSES. In the field of Chinese linguistics, the long debate on how locative *zai*, such as the one in (3), should be analyzed has still not been settled. Some grammarians consider it a 'coverb', which is basically a verb, but 'always plays a secondary role of assisting the main verb in a sentence' (Li & Thompson 1981). One reason for this view is that *zai*, as well as other present-day coverbs, were originally full verbs. Many of the coverbs are now still used as verbs at the same time with similar meaning. For example, in modern Chinese *zai* is used both as a verb and as a coverb indicating location. A second reason is that such a *zai* can be interpreted as if it were a verb. Thus (3) can be understood as in (3)' below, in which the first *zai* is a verb and the second one is an adverb. When the two sentences are combined into one, the second *ta* 'he' and *zai* are omitted to avoid redundancy, resulting in (3). According to Chen (1978), this is an example of 'distant haplology'.

(3)' *Ta zai wuzi-li, (ta zai) chang ge.*
he ZAI room-in he ZAI sing song
He is in the room and (he is) singing.

A third reason for the coverb analysis is that many contemporary 'coverbs' carry verbal characteristics. Not only do they take complements, but some of them can also be followed directly by a durative aspect marker *zhe* (e.g., (6)), as normal verbs can (Tai 1982)[1]. It is argued that since serial verb constructions are very common in Chinese, the concept of coverb should be easily accepted.

(6) *Ta yan zhe he kaiche.*
he along DUR river drive
He is driving along the river.

The critics of the 'coverb' analysis (e.g., Li & Thompson 1974, Lu 1985) argued that the coverb analysis is not plausible for several reasons. First, preverbal locative *zai* can not always be interpreted along the lines of (3)a. Sometimes, when a sentence as in (3) is split into two as in (3)a, the meaning may be different. (7) and (8) are two examples to illustrate this point. In (7), 'he' may or may not be at the scene when the event of buying occurs; in (8), 'the professor' can not possibly 'be on the board' when he is writing. Splitting the sentences into two, however, would force the interpretation in the way that will alter the original meaning of the sentences.

(7) *Ta zai meiguo mai fangzi.*
he ZAI America buy house
He is buying house(s) in America.

(8) *Jiaoshou zai heiban-shang xie zi.*
professor ZAI board-on write character
The professor is writing character(s) on the board.

Secondly, there is a great difference between *zai* as a main verb and as a preverbal locative. *Zai* as a main verb always indicates the location of the subject, whereas *zai* as a preverbal locative usually indicates where the event takes place, as in (7) and (8).

Thirdly, when a preverbal *zai* is analyzed as a coverb, this *zai* and the verb are considered as being in a 'serial verb construction'. However, verbs in normal serial verb constructions always designate separate actions, with each verb being a centre of predication. This is not true for *zai*. When *zai* is used in a preverbal position followed by a verb, e.g., in (8), only one action takes place, e.g., *xie zi* 'writing characters'.

Similar to the arguments on the categorization of preverbal locative *zai* as coverbs or prepositions, there has also been controversy on the analysis of *zai* as an aspect marker or adverb, illustrated in (5). Some researchers consider the *zai* as an aspect marker (Li & Thompson 1981), because it indicates the on-going state of an action. Others (Wang 1958, Lu 1985) argue that such a *zai* should be an adverb, because: (a) aspect markers in Chinese (such as durative *zhe*, perfective *le* and experiential *guo*) all occur after main verbs, while *zai* in this usage occurs in front of the verbs only, and (b) *zai* can co-occur with a durative aspect marker *zhe*, as in (9), which excludes *zai* being seen as an aspect marker.

(9) *Ta zai he xuesheng shuo zhe hua.*
he ZAI with student(s) speak DUR words
He is talking with student(s).

Looking at the different opinions on the analyses of *zai* described in this section, we can see that traditional approaches base their analyses on the theoretical assumption that the meaning of linguistic expressions can be discretely categorized and that this categorization corresponds sharply to well-defined grammatical categories. Thus analysis of the lexicon is expected to make simple categorial judgements. This may work well with simple, clear-cut cases such as (1) and (2). Problems will always arise when the behavior of linguistic expressions is observed to be inconsistent, because the theoretical analysis makes no allowances for the inconsistency. The setting up of the category 'coverb' is an attempt to deal with marginal behavior of linguistic expressions. But, due to the general theoretical assumption, the problem can not really be solved with a rigid view of categorization.

1.5. SEMANTIC ASPECT OF *ZAI*: LOCATIVE VS. TEMPORAL EXPRESSIONS. When *zai* is used as a main verb, it has an important feature, i.e., it only takes locative expressions as complements, not temporal expressions, as shown by (10) and (11). This seems intuitive, since 'I am/exist today' is semantically odd in English as well.

(10) *Wo zai xuexiao-li.*
I ZAI school-in
I am in school.

(11) **Wo zai jintian.*
I ZAI today
*I am/exist today.

It is interesting to speculate on the reason behind this pattern. The domain of space may be conceptually more concrete than the domain of time for the state of 'being' (Tai 1993). Existence in location, for example, can be designated by a verb *zai* followed by a locative expression, whereas existence in time can not be designated the same way. An alternative view is that the existence in time is more fundamental and implicit, but location more often needs to be overtly specified (Langacker 1987). (10) and (11) reveal a privilege locative expressions have over temporal expressions with the use of *zai*. However, when *zai* is used in preverbal or postverbal positions, it can take temporal expressions as complements, especially for more specific time spots as the one shown in (12). This is an important difference between *zai* as a verb and as a coverb/preposition.

(12) *Wo zai jintian xiawu san dian kanjian ta le.*
I ZAI today afternoon 3 o'clock see he PERF
I saw him at 3 o'clock this afternoon.

A point to note is that the privilege locative expressions have over temporal complements after a verbal *zai* is still present when *zai* is used in a preverbal position. In this position, *zai* is obligatory for locative expressions, but optional for temporal expressions. Leaving it out in the locative expression in (3), for example, would result in an ungrammatical sentence. But general temporal expressions (i.e., without specifying an exact time spot) can always go without a *zai*, as in (13).

(13) *Wo jintian kanjian ta le.*
I today see he PERF
I saw him today.

The privilege that locative expressions have can be demonstrated further by another point. When both time and location are specified in a clause, time has to be put in front of location. But note only one *zai* is used, and it is used in front of the locative expression. For example:

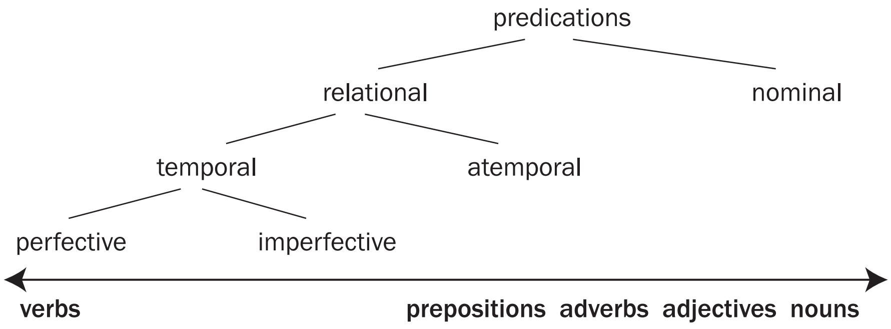

Figure 1: Categorization of predications and corresponding grammatical categories.

(14) *Wo jintian zai xuexiao kanjian ta le.*
I today ZAI school see he PERF
I saw him today in school.
(15) **Wo zai jintian xuexiao kanjian ta le.*
I ZAI today school see he PERF

In view of the different uses, functions and the characteristics of *zai* presented so far, as well as the difficulty encountered in the analysis using traditional approaches, I would like to present a comprehensive and unified analysis of *zai* in the next section. This task can be accomplished by taking a more relaxed view of categorization advanced by Cognitive Grammar.

2. COGNITIVE ANALYSIS OF *ZAI*

2.1. THEORETICAL PREREQUISITE. Cognitive Grammar claims that every unit in language is a symbolic function that is bi-polar in nature. At one pole is the phonological string. At the opposite pole is the corresponding semantic structure. The semantic pole of any linguistic expression is referred to as a PREDICATION. Predications are divided into two major kinds, NOMINAL predications that are typically designated by nouns and RELATIONAL predications that are designated by two or more profiled entities. There are, in turn, two kinds of relational predications: TEMPORAL and ATEMPORAL. The semantic structure of temporal predications is obligatorily instantiated through time and, therefore, shows a positive temporal profile, while the semantic structure of an atemporal predication is independent of time. If we try to match traditional terms with the terminology in Cognitive Grammar, a finite verb would typically present a temporal predication; a preposition or adverb would designate an atemporal predication. Temporal predications are further divided into two types: PERFECTIVE, which involves a change through time, and IMPERFECTIVE, which does not. The categorization of predications and corresponding grammatical categories relevant for this paper are presented in

Figure 1 (developed from Langacker, 1987, ch. 2). Please note that this categorization should be interpreted not as hierarchical, but gradual. There are no sharp boundaries between categories.

Cognitive Grammar also recognizes that conceptual categories are often organized radially with prototypical instances in the centre and nonprototypical instances at some conceptual distance from the prototype (Langacker, 1991). Since the distance between prototypical and nonprototypical categories varies, the membership in a linguistic category is a matter of degree. In cognitive grammar, there is also a serious interest in capturing the relationship between different senses of a morpheme.

2.2. COGNITIVE *ZAI*. In the case of *zai*, its prototypical use is as a verb, designating a temporal relational predication functioning as a clausal head. Since all temporal predications are also profiled in a certain location, the prototypical use of *zai* is grounded in two domains simultaneously, i.e. the domains of space and time. Even when time and location are not explicitly expressed, these two basic domains are still evoked in the background meaning. Being a state verb, which involves no essential change within temporal scope, the process that *zai* designates is also imperfective.

During the course of historical change, the use of *zai* has been expanded to take on other functions. When *zai* is used other than as a verb, fundamental changes take place in its function as well as its profiling. Preverbal and postverbal *zai*, be it a preposition, coverb or adverb, do not serve as a clausal head. Its function is to relate the event described by the main verb to specific values in either spatial or temporal domain. Such a *zai* designates atemporal predications instead of temporal.

Going through the different uses of *zai*, one may also realize that the extension in the use of *zai* has always been in the domain of either space or time, as Figure 2 (overleaf) illustrates. Figure 2 is a combination of two verb-to-noun continuums (see Figure 1), one in the domain of space, the other in the domain of time. The meeting point of the two axes locates the prototypical use of *zai* as a verb profiled in both space and time. This profiling, however, is not equal in the two domains, because *zai* is instantiated more in the spatial domain, as demonstrated before. Going through a dictionary of modern Chinese, for example, one would also find that about 90% of the entries with *zai* (in monosyllabic and disyllabic words) designate location in space. Locative *zai* relates not only to the concrete physical world, but also to the abstract conceptual world, as shown in (16) and (17):

(16) *zai lilun-shang*
ZAI theory-on
in theory

(17) *zai… qingkuang-xia*
ZAI… circumstances-under
under… circumstances

According to Cognitive Grammar, membership of grammatical categories is a gradient notion. Lexical items may show major characteristics of (and therefore be classified as belonging to) one category, but have features of another. For example, some prepositions/coverbs (but not all) can be followed by an aspect marker (i.e.,

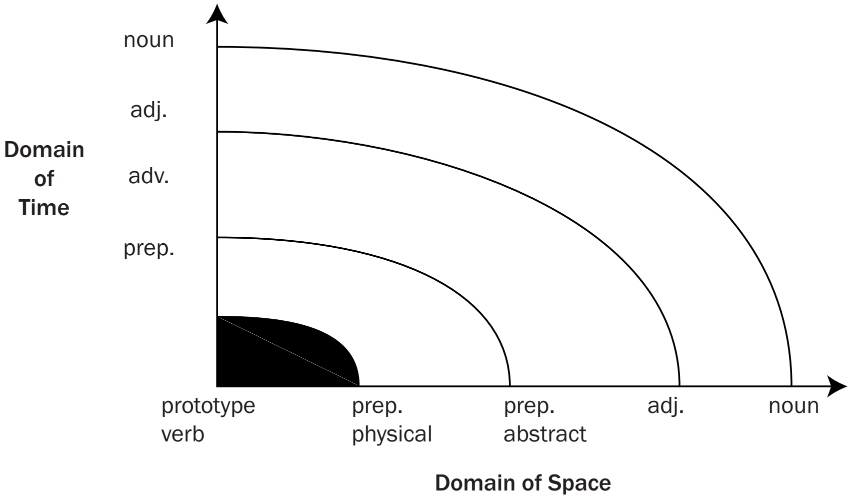

Figure 2: The extension of *zai* from the prototype.

a characteristic of verbs), as shown in (6). But this does not mean that these prepositions/coverbs have to be analyzed as verbs, or they have to be considered as members of a different category. Previous research has shown that, to a large extent, how many verbal characteristics have been retained in the use of one particular lexical item and how far this item has traveled along the historical route from verb to preposition has to be determined on an item to item basis. Therefore, only by using a gradient notion of class membership can we account for individual variation as well as prototypical vs. non-prototypical uses of words.

So far, we have only looked at monosyllabic uses of *zai*. As we know, the Chinese lexicon has gone through the general development from monosyllabic to disyllabic words. At the same time, lexical items such as *zai* have extended their usage in the way illustrated in Figure 2. As the product of these two processes, many uses of *zai* as a verb or a coverb/preposition have been lexicalized together with their complements and modifiers, resulting in disyllabic words. These words are mostly verbs, adjectives and adverbs in modern Chinese, with very few examples of nominals, e.g., (18)–(21):

(18) *Zhezhong shi bu cun-zai* (verb)
such thing NEG exist-ZAI
Such a thing does not exist.

(19) *Wo shi-zai tai lei* (adv.)
I real-ZAI too tired
I am really too tired.

(20) *Ta hai zai-shi* (verb/adj.)
he still ZAI-world
He is still living.

(21) *Wo bu zhidao tade suozai* (nom.)
I NEG know his whereabouts
I don't know where he is.

Among the very few examples of disyllabic words with *zai* relating to the temporal domain, *zai-ji* 'soon' is an adjective and *zhengzai* (indicating action in progress) is an adverb. *Xianzai* 'now' shows further extension from the prototype, because it is used not only as an adverb (in (22)), but also as a noun (in (23)), arriving at the far end of the continuum.

(22) *Ta xianzai chuqu le* (adv.)
he now go-out PERF
He has now gone out.

(23) *Xianzai shi 1999 nian* (nom.)
now be 1999 year
Now (it) is 1999.

If we relate all the phenomena discussed in this section to Figure 2, we can see that the monosyllabic uses of *zai* are located at and around the centre of the prototype. The further away from the centre a usage is, the fewer verbal characteristics it has. The change, again, is gradual. Even within the category of coverb, which is considered a transition stage from verbs to prepositions, some coverbs can take aspect markers and, thus, have more verbal characteristics than those that cannot. In this section, we have also seen that adjectival and nominal *zai*, being at the far end of the continuum, can only be disyllabic words. It seems that, in order to function as adjectives and nouns, *zai* needs at least another morpheme for semantic (and probably also prosodic) support.

3. SUMMARY AND FURTHER RESEARCH QUESTIONS. This paper has provided a comprehensive analysis of *zai* within the framework of Cognitive Grammar. It has demonstrated that the prototypical use of *zai* is as a verb, designating temporal relational predications. As a product of historical change, the uses of *zai* in contemporary Chinese also display a full range of extensions, first to non-prototypical uses of designating atemporal relational predications, and then to nominal predications, also non-prototypical. It seems that this extension can be characterized by two processes. One is grammaticalization, which accounts for the development of *zai* as a monosyllabic word from a verb to a preposition and an adverb. The other is disyllabicization, which accounts for the uses of *zai* in disyllabic content words. It will be very interesting to further investigate how these two processes interact in the development of the Chinese lexicon in general.

The paper has also pointed out that the extension in the use of *zai* is gradual in that the different uses retain verbal characteristics of *zai*, but to different degrees. This has caused fuzzy boundaries among its different grammatical functions. As a result, any effort to impose clear-cut divisions among its grammatical categories would prove to be difficult. In Chinese, many lexical items have gone through a similar development not only from prototypical to non-prototypical usage, but also from monosyllabic to disyllabic words, where the basic meaning of the lexical items has been retained in the different extensions. An appropriate theoretical framework is needed to account for this distinctive feature of Chinese.

Since the use of language shows a multiplicity of interacting factors, as well as central and peripheral uses, we need to work in frameworks that take into account all the factors in the determination of the shape and import of linguistic expressions. It is hoped that the approach of Cognitive Grammar is such a framework in which linguistic analysis of individual units can be carried out without losing sight of the grand picture.

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[1] *Zai*, however, can not be followed by *zhe*, which shows variation within the same category.

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EVENT INTEGRATION, THE SEMANTICS OF THE PARTICLE *LE* AND ‘IMPLICIT’ RESULTATIVES IN CHINESE

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Resultative constructions have been discussed in a number of frameworks in recent years (Jackendoff 1990, Goldberg 1995, Levin & R. Hovav, 1999, *inter alia*)[1]. While many analyses have also been proposed for Mandarin Chinese resultatives (see e.g., Ernst 1996 and references therein), this paper focuses on a special type of resultatives which has not been given as much attention as it deserves in the literature of Chinese linguistics. The canonical examples that concern us are included below,

(1) *Xiaowang pao-le yi-shen han*
Xiaowang run-LE one-body sweat
Xiaowang ran and as a result got sweaty all over.
(2) *ta nong-le yi-shen hui*
he do-LE one-body dust
He got dusty all over.
(3) *wo mo-le yi-shou you*
I touch-LE one-hand oil
I touched *x* such that my hand got oily all over.
(4) *wo caile liang-jiao ni*
I stamp-LE two-foot mud
I walked and got my feet covered with mud all over.

On the surface syntax, the sentences above are all headed by an activity verb, which is followed by a NP designating substances, such as sweat, dust, oil and mud. Intuitively, these sentences seem to assert results brought about by the events denoted by the main verbs. For example, in (1), sweating all over is a result of running. Apparently, the result is expressed by the NP that follows the main verb. However, this paper argues that the post-verbal NP in these examples does not directly express result, but rather only implicitly relates to a resultative predication, which is in fact entailed by the semantics of the particle *le* (cf. Sybesma 1997). This suggestion allows us to uncover hardly noticed resultative readings associated with the following,

(5) *wo kan-le san tian*
I read-LE three day
I read *x* (for) three days.

(6) *wo gai-le yi xiawu*
I revise-LE one afternoon
I revised *x* (for) the whole afternoon.

(7) *wo mang-le bantian*
I busy-LE half-day
I kept busy for half a day[2].

I will argue that the temporal expressions of extent in (5)–(7), while typically understood as event modifiers, are indirectly associated with resultative predication on par with (1)–(4). I demonstrate this by showing the unified semantic structure of (1)–(7) on the resultative reading. Furthermore, the post-verbal NPs in (1)–(7) are obviously not subcategorized by the main verb, which can be either intransitive, e.g., (1), or transitive, e.g., (5). The use of a transitive verb in these sentences entails a change in argument structure, since its normal internal argument will be suppressed (see (5)). The questions then are how are the non-subcategorized NPs licensed in these sentences? What are the factors that alter the argument structure of the main verbs? The goal of this paper is to provide a semantic account of the argument structure of the type of 'implicit' resultative constructions as exemplified above. Two major research issues are laid out below,

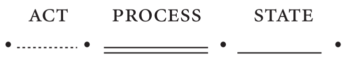
a. What is the semantic/conceptual structure representation of the resultative readings on these sentences? How does the semantics of the particle *le* figure in this representation?
b. How is the lexical semantics of the verbs related to the resultative reading?

An answer to the first question helps us to exactly locate the source of resultative reading and thereby explicate the way the postverbal NP is licensed. Tackling the second question leads us to semantic answers to argument structure alternations. This also brings us to the larger goal, which is to lend support to a richer semantic component at the syntax-semantics interface and to contribute to the growing literature on the relations between verbal semantics and syntactic structure (see especially Goldberg 1995 and 1997, van Hout 1998 and the papers in Butt & Geuder 1998). The approach I adopt in this paper is the event structure-based projection of syntax, which is essentially a correspondence rule strategy as opposed to syntactic and lexical strategies (see Jackendoff 1990). I take this to subsume the Construction Grammar approach of Goldberg (1995). The particular version of the event structure model is adapted from Croft (1998), but the model will be supplemented with insights from Jackendoff (1990) as well. The next section discusses the semantics of the particle *le* under the adopted even structure perspective. This will be followed by a conceptual structure analysis of 'implicit' resultatives in Section 2, which leads us to the ways verbal semantics are integrated into resultative eventualities (Section 3). The paper concludes with a summary and implications. It is to be noted that details of linking are outside of the focus of this paper.

2. THE SEMANTICS OF LE AND EVENT STRUCTURE. The semantics of the verbal particle *le* has always been a thorny issue in Chinese linguistics, as witnessed by the many descriptive but often inconsistent and unexplanatory accounts. Sybesma (1997) summarizes the available proposals under three headings: completion, termination and inception of events. Obviously, an explanatory account would best derive these disparate semantic effects from an independent source. Sybesma does exactly this when he argues that the so-called aspectual particle *le* is a resultative predicate. This proposal is, as will be seen later, close to the spirit of the present paper, but the problem is that *le* does not have the specific content a predicate needs to have (i.e., denoting an eventuality). The way the previous accounts of *le* fail on explanatory grounds relate, in my view, to a lack of or a failure to utilize an articulated semantic theory.

In the spirit of Dowty (1979) and others, Croft (1998) proposes a decompositional model of event structure, which conceptualizes any 'raw' event as a causally related chain of events, as presented in (8):

(8)



Each segment on the causal chain is identified by two participants. The ACT segment is defined by the force-dynamic relationships (Talmy 1988) between participants[3]. Different verbs denote or profile the segment(s) of the causal chain within the base or frame of the entire event structure, thus providing a basis for defining semantic classes of verbs. The notion of event profile is close to that of event headedness in other frameworks (e.g., Pustejovsky 1995), both playing a crucial role in argument linking. On Croft's approach, a predicate expression either conforms to the event structure in (8) lexically or does so via event composition involving multiple predicate elements. This resembles Event Type Composition in van Hout (1998:241) that is proposed to account for the event type-shift of a verb. I expect that the semantics of the particle *le* can be restrictively elucidated from the perspective of an elaborated event structure. I start from a basic observation that the particle *le* often expresses the transition between an event and a state, as illustrated in the following that features a resultative compound verb:

(9) *ta you da-cui-le yi-ge wan*
he again hit-broken-LE one-CL bowl
He broke another bowl.

Note that (9) differs from (10) below in that the state of being broken is additionally assigned a temporal structure:

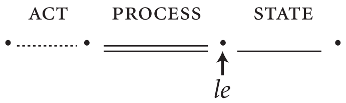
(10) *ta jinchang da-cui wan*
he often hit-broken bowl
He often breaks bowls (by accident).

In other words, whereas the state of being broken is incorporated as part of a complex event in (9), the same state in (10) remains an atemporal state. I attribute this difference to the particle *le*. Further support of this idea comes from examples like the following, where *le* turns a state expressed by the adjective *hong* into an event:

(11) *hua* *hong-le*
flower read-LE
The flowers went red.

In view of the event structure given in (8), i propose that the particle *le* profiles the transition point (indicated by ↑ below) between the non-stative segments (i.e., ACT and PROCESS) and the resultative stative segment on the causal chain, taking the whole chain as its base:

(12)



The semantic effects of the particle *le* as noted above fall out on this proposal. Another consequence of the proposal is that a V+*le* expression always entails a resultative state, even when the state is not explicitly asserted. Given this proposal, it would seem reasonable to wonder if deeper motivations lie behind this particular lexicalization property or it is just an arbitrary feature peculiar to Chinese. A closer look at the position of *le* within event structure points us to the former possibility. This particular point on the causal chain brings the process event and the stative event together into a new event type, the transition type (achievements and accomplishments), which according to traditional Dowty-type of analyses would contain a primitive predicate BECOME in its decomposition. As Croft points out (p.c.), this point is logically equivalent to the traditional operator **BECOME**. Further, it must also be equivalent to the function **INCH** (inchoative) as used in Jackendoff (1990), which takes a state as its argument[4]. Just as the operator **CAUSE** is morphologically realized in certain languages, it shouldn't be surprising to find languages that lexicalize the function **INCH** or **BECOME**. Furthermore, this particular lexicalization appears to be correlated with the fact that Chinese does not have simplex transition verbs (Tai 1984, Sybesma 1997), thus resembling languages like Japanese and Tamil in this respect (Croft 1998).

As is well known, the particle *le* always attaches to a verb or an adjective: it has a very specific distribution. Now, as i argued above, it is also associated with a structured piece of conceptual structure (exhibiting a semantic argument structure), even though very schematic. Put in more abstract terms, this linguistic item falls within the correspondence rule component in the sense of Jackendoff (1990). Equivalently it could be taken as a lexical construction in the sense of Construction Grammar.

2. CORRELATING CLASSIFIERS WITH RESULTATIVE STATE. Defining the semantics of the particle *le* on the causal chain as we did in the last section, we get the consequence that V+*le* string always entails a resultative state, with the semantics of the verb fusing with the causing segments (ACT, PROCESS). However, while the resultative meaning is apparent in sentences like (1)–(4), sentences like (5)–(7) are not so obviously resultative, as pointed out by one reviewer, since expressions of temporal extent are more easily read as temporal modifiers and we don't see any resultative state explicitly expressed. Nevertheless, we can highlight the resultative reading by taking note of the following facts. In (1)–(4), it is usually possible to substitute the main verb with a compound verb, with the second element of the compound denoting a resultative state, such as *pao-chu* 'run-out', *long-shang* 'do-on' (cf. typical resultative compounds such as *da-po* 'hit-broken'). Likewise, we could paraphrase sentences like (5)–(7), substituting resultative compounds for the main verbs[5]. Compare (5) with the following:

(13) *wo kan-qu-le san tian*
away
I read away three days.

In contrast, if *san tian* is intended as a temporal modifier, as in an answer to a 'how long…' type of question, it would not be felicitous to use (13) as the answer. In addition, on the resultative reading as made explicit in (13), the event encoded by the main verb itself is not committed to a telic reading:

(14) *wo kan(-qu)-le san tian hai zai kan*
I read away three days, and am still reading.

By contrast, taken as a modifier, the temporal expression *san tian* would serve as a frame adverbial (Dowty 1979), interpreted as 'within three days', which is an indication that the event expressed by the main verb has reached its terminal point. We could also take hints from these facts as to the status of the postverbal temporal phrase. On the frame adverbial reading, it is an optional adjunct; on the resultative reading, it is an obligatory argument.

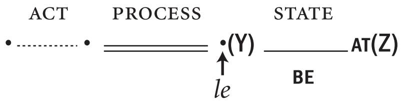
The potential of substitution with resultative compounds indicates that the postverbal NP, temporal or otherwise, is not directly associated with resultative meaning, contradicting my initial intuition mentioned in Section 1. This conclusion is also compatible with the argument status of the postverbal NP on the resultative reading. Now, the resultative constructions in English, as extensively studied in the literature, typically have an AP or PP expressing the resultative state, and thus in this respect they are explicit. The examples under discussion are interesting in that they do not have an overt result-denoting phrase, hence the term 'implicit' resultatives. By hypothesis, even though implicitly resultative, these examples must contain certain elements that trigger the resultative reading. How to identify those elements?

We could pin down the crucial elements in resultative predications by looking at their event structure, a version of which relevant to my purposes has been given in Jackendoff (1990):

(15) [**CAUSE ([X], [INCH [BE ([Y], [AT [Z]])]])**
[**BY [F ([X])]]**]

This representation could be translated into Croft's geometric system roughly along the following lines:

(16)



In (15) and (16), the argument **Z**, usually encoding a property, is crucial, since it is always expressed by an AP in explicit resultatives in English, as in

(17) He hammered the metal flat.

In view of foregoing discussions, it is reasonable to assume that the postverbal NPs in Chinese 'implicit' resultatives correspond to the argument **Y** in the above representations. The problem then is that the argument **Z**, crucial in overt resultatives, is not overtly expressed in these cases. Put another way, the question is how is it possible to identify the resultative STATE segment if **Z** is not expressed in the syntax?

The semantic structure of the postverbal NP gives us clues to the answer. A closer scrutiny of examples (1)–(4) shows that the postverbal NP has a number of distinctive properties. First, the head N denotes substance, and thus does not exhibit inherent semantic partitioning: it is a kind of *media*, in the sense of Jackendoff (1990). Second, the head N is always preceded by a classifier that assigns a feature [bounded] to the substance noun. Cheng and Sybesma (Ms.), among others, term it *massifier* (mass classifier), highlighting the dynamic process in making the substance bounded. Third, the massifier is further preceded by a numeral, but it seems it cannot be freely substituted by other numerals—consider (18) in comparison with (1):

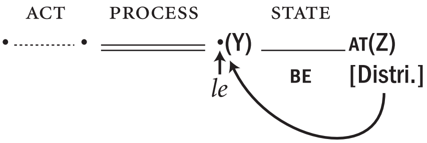
(18) **Xiaowang pao-le sanshen han*
three-body

Given the non-intrinsic relation between the massifer and the head noun, i suggest that substance noun ends up being bounded as a corollary of the resulting subevent. In other words, going back to the event structure in (16) above, the resultative state takes a property (**Z**) (which may be something like IN-EXISTENCE) as a reference object to locate the substance. Given the nature of the theme as a medium (i.e., unbounded), the way to locate it must be of a distributive nature (see Jackendoff 1990). As a result of this distributive location, the theme medium is assigned a closed form in terms of the massifier. Put from a different angle, the massifier associated with the theme indicates the presence of the function **AT** with the feature [distributive]. As pointed out by Jackendoff (1990), the theme in a distributive location must not be definite (i.e., not intrinsically bounded). This is borne out in these cases too, as the following illustrates:

(19) **Xiaowang pao-le na-shen han*
that

The correlation between the form of the theme medium (**Y**) and the distributive function **AT** is shown in (20):

(20)



Furthermore, the string **AT(Z)** cannot stand alone; the function **BE** must be created, taking the string as its argument, following Nikanne (1990, 1997)[12]. Basically then, the locative string **AT(Z)** identifies the resultative STATE. In addition, the non-subcategorized postverbal NPs are licensed as the first argument of the created function **BE**. Now, to return to the special numerals put before the massifier, i suggest that they are evidence of this distributiveness: they can be taken to mean 'whole', 'all over', thus explaining their non-substitutability with other numerals.

Turning back to the more difficult cases involving temporal expressions (see (5)–(7)), we should expect this theory to be able to address the ambiguity noted in beginning of this section: why could the post-verbal temporal NPs be interpreted as either resultative or adverbial? In this view, this will have to do with the semantics of temporal expressions. Without going into an elaborate theory of temporal NPs, suffice it to suggest that 'numeral + temporal head noun' phrases could be taken as a kind of media with no intrinsic boundaries: what are the boundaries of time after all? On this understanding, numerals together with head nouns would be read as 'artificial' massifiers, while the semantic head is the boundless 'time', which is not expressed, but could be added, in this kind of noun phrase:

(5)' *wo kan-le san tian de shijian*
DE time

In (5)', which is a paraphrase of (5) on the resultative reading, the semantic head 'time' is expressed as the head of the NP. This shows that a temporal substance noun is present in conceptual structure on resultative reading. Alternatively, 'numeral + temporal head noun' could be construing a bounded span of time. Interpreted this way, time is conceptualized as intrinsically bounded in terms of days, hours, etc. Thus such expressions can serve as frame adverbials, and in this use, no additional head noun could be added.

To summarize this section, the constructional meaning of the particle *le* laid out in Section 1 provides a schematic basis for resultative meaning, while the massifiers associated with postverbal substance nouns signal the presence of a distributive locative function, which further elaborates the resultative schema associated with the particle *le*. A final wrinkle left is that all these do not seem enough to establish what kind of resultative state we finally come up with, for example, why (1) means the appearance rather than disappearance of sweat. The only answer seems related to an interaction of the semantics of the main verb with the constructional schema of the particle *le*, to which i turn in the next section.

3. EVENT INTEGRATION. Recall the proposal in Section 1 that the particle *le* is a construction associated with a schematic conceptual structure (12). This schematic structure can be elaborated by integrating with needed predicate expressions, much in the way verbal semantics is integrated with argument structure constructions (Goldberg 1995, 1997)[7]. Jackendoff (1990) appeals to a type of adjunct rules as part of the correspondence rule component to take care of the same issue, taking the main verb as imposed from a modifying means clause. This shows that resultative predications involve macro-events and event conflation (Talmy 1990). Given the schematic event structure associated with the particle *le*, there are logically three ways in which predicate expressions can be integrated within the constructional semantics of the particle *le*: either the segment(s) preceding the transition point or that following the transition point or both at once[8] can be integrated with verbal/adjectival semantics. The different ways of integration produce different event-semantic configurations, which should in turn derive the various semantic effects associated with the particle *le* as referred to in Section 1.

The cases that concern us in this paper exemplify the first option, namely, elaborating the segment(s) preceding the transition point by conflation. Take (1) for example. The verb *pao* 'run' could be taken as imposed from a subordinate means clause in conceptual structure on the PROCESS segment of event structure and conflate with it, thereby elaborating the PROCESS segment[9]. There are constraints on event integration, which has been much studied in the literature (see e.g. Goldberg 1995, 1998, Matsumoto 1996, among others). I briefly discuss one that is related to argument structure. As observed in Section 1, a transitive verb such as *kan* 'read' in (5) has to suppress its internal argument in order to be used in implicit resultatives. The sentence would not be read as implicitly resultative if the internal Patient argument were added, as the following illustrates:

(21) * *wo kan-le nei-ben shu san tian* (problematic on resultative reading)
I read-LE that-CL book three day

In (21) the temporal expression would be interpreted in no other way than being an event modifier. Phrased differently, the issue seems to be that lexical conceptual structure (LCS) are invisible to syntax under certain circumstances or is 'underparsed'. Grimshaw (1995) takes un/underparsing as a process available from the UG, but what exactly determine the underparsing of LCS and the consequent argument suppression? The explanation could proceed from two related perspectives. One is information status. In order for transitive verbs to be used in 'implicit' resultatives and have their internal arguments suppressed, the internal argument must lack local informational salience and be retrievable from discourse or syntax. The retrievability from syntax is illustrated by the so-called verb-copying construction in Chinese:

(22) *wo kan nei-ben shu kan-le san tian*
I read that-CL book read-LE three day

As can be seen in (22), the verb suppresses its internal argument after fully realizing its LCS in the same sentence. Furthermore, defocusing the internal argument is balanced by an increase in the informational prominence of the postverbal NP (an adjunct with respect to the argument structure of the main verb)[10]. Similarly, Goldberg (to appear) appeals to information structure to explain object drop with certain causative verbs.

A different perspective stems more directly from constraints on event integration itself. Following Jackendoff (1990), we could formulate a constraint informally as follows:

> In event integration, a subordinate event cannot be conflated with a framing event if it has a Patient which is not co-referential with the Patient of the framing event.

The notion Patient is understood in the wider sense, including both grammatical (i.e., determined by argument structure) and discourse Patient (see Jackendoff 1990 for discussion). (Cf. (20) again.)

In this structure, it is reasonable to assume that **Y** is the Patient, since it is the argument acted upon and thereupon reaches a state. If the subordinate event conflated with this structure had a different Patient, there would be no argument position in the framing structure for this Patient. Thus intransitive verbs would be able to fuse with the structure without any problem. For transitive verbs, we have to assume that part of its LCS is deprofiled and opaque to this conflation process, which in effect turns them into intransitive verbs. For some verbs, we could assume that argument suppression makes it possible for the verb to take **Y** as its discourse Patient. For example, while the verb *kan* 'read' does not lexically specify 'time' as its Patient, pragmatically we could assume reading is a process that negative affects (or consumes) time and hence we have 'implicit' resultatives like (5). As an independent evidence for change in argument structure, we contrast the possibilities of co-occurrence with volitional adverbials. Consider the following:

(23) a. *wo renzhen kan-le nei-ben shu*
I carefully read-LE that-CL book
b. **wo renzhen kan(-qu)-le san tian* (problematic on resultative reading[11])
I carefully read(-away)-LE three day

The contrast is explained by the change in argument structure: volitional adverbials seem to go with particular kind of Patient.

4. CONCLUSION. Based on Croft's event structure model, I have proposed that the semantics of the controversial particle in Chinese *le* can be usefully defined as profiling the transition point between an event and its resultative state, while taking the whole composite event as its frame. The constructional meaning of the particle *le* thus laid out provides a schematic basis for resultative meaning, which could be fleshed out in several logically possible ways. The 'implicit' resultatives in Chinese demonstrate one way by which verbal semantics is integrated with this schema. The paper raises the possibility of typological parameters for expressing resultative predication based on the schematic resultative construction and ways of conflation. A novel explanation for the implicitness of resultatives is sought in the correlation between the nature of a type of classifiers (i.e., massifiers) and resultative state. The paper combines the semantic machinery of both Croft (1998) and Jackendoff (1990). This seems to indicate that Croft's geometric representation need to be elaborated for purposes of licensing and interpretation. Furthermore, my proposal has suggested a new way to model the elusive semantics of the particle *le*. It remains to be seen if this could unify the large number of empirical findings on this topic in the literature.

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[1] Part of this research was carried out on a visit to 1999 LSA Summer Institute held at University of Illinois at Urbana-Champaign. I thank Graduate Student Association of York University for partial funding and Adele Goldberg for helping to make the trip possible. This work has benefited from discussions with Bill Croft, Adele Goldberg and Barry Miller. I also wish to thank the two anonymous reviewers and the editors for their helpful comments on an early version of this paper. All remaining errors are of course my own responsibility.

[2] This is usually taken to mean being busy quite a while, rather than literally half a day.

[3] This is notated as CAUSE in Croft (1998), which I have replaced with ACT, in order to distinguish it from the primitive function **CAUSE**.

[4] Thus the structure as presented in (8) is less sufficient to represent a full resultative predication, compared to an algrebraic representation.

[5] Though there may be certain as yet unclear constraints:

(i). *? wo gai-qu-le yi xiawu*
away

Still the resultative meaning intended seems perfectly fine. So the relevant constraints, whatever they are, must not be semantic.

[6] Function creation is an operation based on Nikanne's classification of primitive functions and roles into zones. **BE** is a function in the central zone (Zone 2) which must be present whenever a lower Zone 1 function is present (see Nikanne 1990 for details).

[7] See van Hout (1998) for a similar approach to the incorporation of events into a frame.

[8] The latter two options are exemplified by Adjective-*le* and resultative compound respectively, see (11) and (10) in Section 1.

[9] Example (2) is somewhat different in that the main verb *nong* 'do' seems like a light verb; it does not make much sense to take it as related to a means clause. Following Goldberg (1995, 1997), we could take it as being related to the PROCESS segment by direct instantiation. I thank one reviewer for drawing my attention to this example.

[10] Compare Goldberg and Ackerman (2000) who account for obligatory adjuncts in terms of focus and Gricean principles.

[11] The optional second morpheme in the resultative compound is added there as a reminder of the possibility for resultative predication.

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IDIOMS: VARIANTS, MODIFICATIONS AND ERRORS

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In the past decade advances in computer technology have brought about dramatic changes in the practice of lexicography with corpus-based research becoming the norm. The technological advancements have fueled interest in collocations, idioms and other multi-word units as computer searches enable lexicographers to rapidly retrieve lists of occurrences of relatively rare phraseological units. Lexicographers have come to rely on powerful statistical software to produce corpus-derived frequency data which is used to order meanings, variants, etc.

While computer technology has greatly facilitated access to linguistic data, it has also fostered the belief that the sheer quantity of data can somehow replace the careful, detailed and systematic analysis which must be at the heart of any lexicographical work. Unfortunately, the fundamental difficulties that phraseology presents to lexicographers cannot be overcome through technological means: the interpretation of the data cannot be left to the computer. Computerized searches of corpus material will turn up not only idiom variants, but also stylistic modifications as well as errors. It is up to the lexicographers to sort them out. In this article, I will seek to define and distinguish these three phenomena. My study is based on a dictionary project involving some 2,000 French idioms, all of which are used in both France and Quebec and all of which have phraseological variants. The data analyzed is derived from a journalistic corpus including newspapers and magazines from the 1990's.

1. phraseological variants. Idioms have traditionally been viewed as fixed expressions and have long been treated as such by lexicographers. Variants, seen as modifications of a base form, have received scant attention and appear only sporadically in dictionaries where they are treated in a haphazard and inconsistent fashion.

My own theoretical view of the idiom and the variant is inspired by the work of Valerij M. Mokienko (1980). I reject the notion of a fixed lexical form and consequently the definition of the variant as a modification of the same. Too often, it proves impossible to establish a base form given the astonishing array of variants found in corpus material outside the narrow confines of the dictionary. Furthermore, such an approach does not allow for the diachronic evolution of idioms nor does it take into account the existence of the same idiom in various dialects and languages.

I consider the idiom to be an abstract model or *phraseoschema* which may be actualized in many different forms, *each* of which is a phraseological variant. The idiom may be likened to the infinitive of a verb which represents a network of predictable forms, each part of the system of the language. One variant, either the most frequent one or the one most commonly represented in dictionaries, will be selected to represent the model for practical purposes. For example, in the case of aspectual networks such as *mettre/ avoir/ garder/ remettre la main à la pâte* 'to put, to have, to keep, to put again one's hand to the plough', the inchoative *mettre* may be selected.

A phraseological variant is a conventional syntagm, recognized by native speakers. Of course, given the low frequency of many variants, one cannot expect *all* speakers to recognize a given variant, let alone understand it or actively use it themselves. Variants of the same idiom may belong to different morphological categories, some being verbal, others nominal, etc. All of the variants of a given idiom will normally have one lexeme in common. Failing that, they will have at least one lexeme in common with at least one other variant of the same idiom. For example, although the variants *le glaçage sur le gâteau* 'the icing on the cake'and *la cerise sur le sundae* 'the cherry on the sundae' do not share a lexeme, each has a lexeme in common with *la cerise sur le gâteau* 'the cherry on the cake'. Finally, the meaning of each variant must be learned as it cannot be derived from the meaning of its individual constituents. However, many variants include a constituent which is used literally as with the verb *promettre* 'to promise' in *promettre monts et merveilles* 'to promise the earth'. Consequently, there exist pairs of variants which differ in meaning in an entirely predictable fashion, e.g., *à bon escient* 'advisedly' and *à mauvais escient* 'ill-advisedly'.

There are two main types of phraseological variability, non-functional and functional. Non-functional variants are identical in meaning and use, differing only in form. Recurrent patterns of non-functional variability are found at the graphic, morphological, syntactic and lexical levels, the examples below illustrating some of the most common patterns.

1.1. NON-FUNCTIONAL VARIABILITY.

1.1.1. GRAPHIC VARIANTS. Idioms consisting of a noun modified by an adjective or containing such a phrase are used with or without hyphenation. The use of hyphenation indicates that they have become lexicalized and are viewed as a single unit, e.g., *prêter main(-)forte à qqn* 'to come to somebody's assistance'.

1.1.2. MORPHOLOGICAL VARIANTS. Idioms consisting of a prepositional phrase containing the masculine adjective *tout* are used in the singular or in the plural, e.g., *à tout crin/ à tous crins* 'diehard'. Since the distinction between the singular *tout* and the plural *tous* is lost in oral French, one cannot choose a form on the basis of how it sounds. This plays an important role in the conservation of these morphological variants in written French.

1.1.3. SYNTACTIC VARIANTS. Idioms containing two parallel phrases are used with or without a coordinating conjunction, e.g., *avoir bon pied (et) bon oeil* 'to be as fit as a fiddle'.

1.1.4. LEXICAL VARIANTS. In verbal idioms, the durative aspect is expressed with the verb *demeurer* or the more common *rester*, e.g., *rester/ demeurer lettre morte* 'to go unheeded'.

1.2. FUNCTIONAL VARIABILITY. The second type of variability is that of functional variability where variants differ in meaning or use. Recurrent patterns of functional variability exist at the morphological, syntactic, lexical and semantic levels, the examples below illustrating some of the most common ones.

1.2.1. MORPHOLOGICAL VARIANTS. Nominal variants may be derived from verbal idioms through the suffixation of the verb. The suffix -*age* is used to form masculine nouns, e.g., *se serrer la ceinture/ le serrage de ceinture* 'to tighten one's belt/ belt tightening'.

1.2.2. SYNTACTIC VARIANTS. Verbal idioms containing an intransitive verb may be used in a transitive construction expressing the factitive aspect. The factitive may be expressed analytically with the verb *faire*, e.g., *sortir de sa coquille/ faire sortir qqn de sa coquille* 'to come out of one's shell/ to draw someone out of his shell'; or synthetically with a verb having a factitive meaning, e.g., *aller au charbon/ envoyer qqn au charbon* 'to do one's full share of the dirty work/ to make someone do his full share of the dirty work'.

1.2.3. LEXICAL VARIANTS. Verbal idioms containing the verb *mettre* may be used with the iterative *remettre*, e.g., *mettre/ remettre la main à la pâte* 'to put one's hand to the plough (again)'.

1.2.4. SEMANTIC VARIANTS. Many idioms may be used both literally and figuratively, e.g., *sortir du bois* lit. 'to come out of the woods' and fig. 'to come out of the woodwork'.

All too often, idioms have been treated as isolated phenomena and the systematic nature of their variability has been given little consideration. Through the use of a relational database, it was possible to discover patterns of variability affecting entire groups of idioms, which would not have been apparent had each idiom been studied individually. From a corpus of occurrences of approximately 2,000 French idioms, I have established a typology of phraseological variability including some sixty patterns, a few of which were illustrated above.

Of course, many isolated cases of variability do exist, particularly at the lexical level. However, at least some of these are inherent in the language and are therefore quite predictable. For example, the fact that the modern French noun *couverture* 'blanket' came to replace the archaic *couverte*, which has been preserved in Canadian French, explains why the archaic variant *tirer la couverte à soi* 'to take all the credit for something', still used in Canadian French, became *tirer la couverture à soi* in the norm.

2. STYLISTIC MODIFICATIONS. Stylistic modifications, very common in journalistic language, differ from variants in that they are not conventional, although they may become so through time. They are deliberate changes to the form or meaning of a variant made by an individual in order to achieve a stylistic effect or to adapt the variant to a particular context. They are created using one of the following six processes:

2.1. SUBSTITUTION. One or more constituents of the variant is replaced by one or more constituents of the writer's choosing. This type of modification is the most demanding of the readers (and can be quite challenging for non-native speakers) because it requires that they mentally reestablish the original constituent of the variant. The relationship between the latter and the substitute may be phonetic, morphological, syntactic, lexical or graphic as in the following example where the idiom *sain et sauf* 'safe and sound' is modified by replacing the adjective *sain* 'healthy, sound' with its homophone *saint* 'saintly' when referring to the pope: 'Le pape repart saint et sauf.' (*Lib*[1]).

2.2. COORDINATION.

a. a constituent word (or syntagm) of the variant, or less commonly, the complete variant, is linked by a coordinating conjunction to a free word of the same morphological category (or to a syntagm having the same structure), e.g., *sauter du coq à l'âne* 'to jump from one subject to another': '[...] on saute allègrement du coq à l'âne (ou de la fourmi au scarabée!) [...].' (*LD*) where the conjunction *ou* 'or' links *du coq à l'âne* 'from the rooster to the donkey' with the free syntagm *de la fourmi au scarabée* 'from the ant to the beetle'.

The relationship between the original constituent and the coordinated element(s) may be phonetic, graphic, morphological, syntactic or lexical.

b. variants of two distinct idioms containing the same verb and having the same syntactic structure are linked by a coordinating conjunction, those with a different syntactic structure being linked without a conjunction, e.g., *tomber en faillite* 'to go bankrupt' and *tomber comme des mouches* 'to drop like flies': '[...], les boutiques tombent (en faillite) comme des mouches!», [...].' (*LP*) where the juxtaposed adverbial phrases are dependent on a single verb.

2.3. SUBORDINATION.

a. a variant of an idiom is subordinated in a relative clause to a variant of a distinct idiom, e.g., *de là à + infinitif, il n'y a qu'un pas* 'from there to x, it's only a short step' and *franchir le pas* 'to take the plunge': 'Mais, de là à rejoindre le Front, il y a un pas que beaucoup hésiteront à franchir.' (*Edj*) where the relative pronoun *que* 'that' represents the noun *pas* 'step' in *franchir le pas*.

b. a variant of an idiom is embedded in the variant of a distinct idiom with which it has one or more constituents in common, e.g., *commencer qqch du bon pied* ‘to get off to a good start’ and *bon pied bon oeil* ‘fit as a fiddle’: ‘Pour commencer l’année du bon pied (bon oeil), rien de tel qu’un voyage [...].’ (*LS*) where *bon pied bon oeil* is the embedded variant.

2.4. EXPANSION. New elements which may be prefixes, determiners or modifiers are added to the variant of an idiom without affecting its basic structure, e.g., *prendre le taureau par les cornes* ‘to take the bull by the horns’: ‘[...] et on prend le taureau constitutionnel par les cornes.’ (*LP*) where the adjective *constitutionnel* ‘constitutional’ modifies *taureau* ‘bull’.

2.5. REDUCTION.

a. the verb in a verbal variant or, less commonly, the noun in a nominal variant is omitted, e.g., *mettre du beurre dans les épinards* ‘to add a little to the kitty’: ‘Du beurre dans les épinards’ (*LM*).

b. the variant is reduced to a pair of nouns linked by a coordinating conjunction not found in the idiom itself, e.g., *voir la paille dans l’oeil de son voisin mais pas la poutre dans le sien* ‘to see the mote in one’s neighbour’s eye and not the beam in one’s own eye’: ‘La paille et la poutre’ (*Dev*).

c. the final syntagm or clause of the variant is omitted, e.g., *deux poids deux mesures* ‘double standard’: ‘Deux poids...’ (*Act*). Suspension points are used to indicate that the remainder of the variant is understood.

Reduction is associated with headlines, titles and names of organizations.

2.6. REMOTIVATION

a. attention is drawn to a specific constituent of the variant by the presence of a formally or semantically related word, e.g., *être aux anges* ‘to be in seventh heaven’: ‘Angélique était aux anges [...].’ (*Dev*), *Angélique* and *ange* ‘angel’ having the same Greek root.

b. the context in which the variant is used activates its literal meaning, e.g., *ne pas avoir dit son dernier mot* ‘to be still capable of intervening’: ‘La radio n’a pas dit son dernier mot: les ondes FM servent de support à toute une série de nouveaux services, en attendant l’avènement de la radio numérique.’ (*LM*).

Certain words and formulaic phrases are used to draw attention to the literal meaning, including *littéralement* ‘literally’, *sic* ‘sic’, *au propre comme au figuré* ‘literally as well as figuratively’, *sans jeu de mots* ‘no pun intended’, *permettez l’expression* ‘pardon the expression’, *si l’on ose dire* ‘if you’ll pardon the expression’, *pourrait-on dire* ‘so to speak’, *si l’on peut dire*, *si on peut dire*, *si je puis dire*, etc. ‘so to speak’.

With all six processes, punctuation, including suspension points, brackets, quotation marks, dashes, exclamation marks and capital letters, is often used to signal to the readers that a variant has been modified.

3. ERRORS. While stylistic modifications are deliberate changes to a variant made by an individual, errors are unintended violations of the rules governing the form, use or meaning of a variant. Errors fall into two main categories, the first containing unacceptable or ungrammatical forms and uses which are aberrant in all contexts in the language, including:

3.1. ORTHOGRAPHICAL ERRORS, especially the improper use of the circumflex, e.g., *faire tache d'huile* 'to gain ground': 'L'appel à la désobéissance a fait tâche d'huile, [...].' (*LP*). Typographical errors, which are made in the production process rather than in the writing process, typically include misprints, doubles and transpositions.

3.2. MORPHOLOGICAL ERRORS.

a. incorrect agreement of a constituent in the context, e.g., *long comme le bras* 'very long': '[...] avec une liste de demandes longues comme le bras, [...].' (*LP*) where the adjective should agree with *liste* ('a very long list of demands') rather than *demandes* ('a list of very long demands').

b. incorrect agreement between constituents, e.g., *tous azimuts* 'all-out': 'Animaux et poupons attendrissent les publics tous azimut.' (*LP*) where the plural determiner *tous* precedes the singular noun *azimut*. Acceptable forms of this idiom include the plural *tous azimuts* and the rarer singular *tout azimut*.

c. incorrect conjugation of the verb, e.g., *aller se faire voir* 'to get lost': '[...], «HLI fout l'camp, vas te faire voir au Vatican».' (*LP*) where the singular present imperative of the verb *aller* 'to go' should be *va*.

3.3. SYNTACTIC ERRORS

a. incorrect syntactic context, e.g., *partir du bon pied* 'to get off to a good start': '[...] le temps d'économiser assez d'argent pour [...] partir du bon pied ma carrière dans la police.' (*LS*) where the intransitive verb *partir* is used transitively with the direct object *ma carrière*.

b. incorrect internal structure of the variant, e.g., *jouer au chat et à la souris avec qqn* 'to play cat and mouse with someone': '[...] un Bruce Willis «bleaché» qui, [...], joue au chat et de la souris avec le directeur du FBI [...].' (*LS*) where the preposition *de* replaces *à* perhaps due to interference from the nominal variant *jeu du chat et de la souris* 'cat-and-mouse game'.

The second category of errors includes those forms, uses and meanings that are unacceptable only within the context of a particular idiom, including:

3.3.1. SYNTACTIC ERRORS

a. incorrect co-referentiality, e.g., *dire ses quatre vérités à qqn* 'to tell someone a few home truths': '«Travaille un peu, chose, avant que je te dise mes quatre vérités...»' (*Voir*) where the possessive adjective *mes* and the subject *je* are co-referential. The correct form of the possessive adjective would be the second person *tes* referring to the indirect object *te*.

b. incorrect syntactic context, e.g., *renvoyer qqch aux calendes grecques* 'to postpone something indefinitely': 'Steve Avery, qu'on avait relégué aux calendes grecques, devait être utilisé exclusivement en relève.' (*LS*) where the direct object is an animate noun instead of an abstract noun.

c. transposition of the constituents of a variant containing multiple syntagms or clauses, e.g., *mettre la charrue devant les boeufs* 'to put the cart before the horse': '[...]: il disait «qu'il ne fallait pas mettre les boeufs devant la charrue».' (*Dev*). Here, it is stated that one must not put the horse before the cart!

3.3.2. LEXICAL ERRORS

a. substitution of a constituent by a formally related word, e.g., *faire la grasse matinée* 'to sleep in': 'Faire la *grâce* matinée avec mon chum.' (*LL*) where the noun *grâce* 'grace' replaces its adjectival homophone *grasse* 'fat'.

b. substitution of a constituent by a semantically related word, e.g., *prendre le taureau par les cornes* 'to take the bull by the horns': 'Comme «prendre le boeuf par les cornes»!' (*LS*) where *taureau* 'bull' is replaced by its hypernym *boeuf* 'steer'.

c. substitution of a constituent by an optional constituent of the same idiom, e.g., *vendre la peau de l'ours* (*avant de l'avoir tué*), 'to count one's chickens before they're hatched', literally 'to sell the skin of the bear (before having killed it)': '[...], qu'ils ne commencent pas à tuer la peau de l'ours [...].' (*LS*) where the verb *tuer* 'to kill' replaces *vendre* 'to sell', the citation reading 'to kill the skin of the bear'.

d. substitution of a constituent by a constituent of a distinct idiom which is structurally or formally similar, e.g., *ne pas mettre tous ses oeufs dans le même panier* 'not to put all of one's eggs in the same basket' and *être dans le même bateau* 'to be in the same boat': '[...]: je n'ai pas mis tous mes oeufs dans le même... bateau!», [...].' (*LS*) where *bateau* 'boat' replaces *panier* 'basket'.

3.3.3. SEMANTIC ERRORS. Semantic errors involve the misinterpretation of a variant, e.g., *renvoyer qqch aux calendes grecques* 'to postpone something indefinitely': '[...] de faire aboutir cette affaire qui «remonte aux calendes grecques» [...].' (*LP*). The verb *renvoyer* meaning 'to postpone' or 'to send back, to refer back' was mistakenly understood in the latter sense and replaced by the synonym *remonter* 'to date back'.

The very banal errors of spelling and grammar which crop up in all written language affect idiomatic language but are of little particular interest for the study of phraseology. Of much greater interest are the errors that can only be considered as such in the context of a given idiom. The many examples of stylistic modifications cited above suggest that the form and meaning of a variant's individual constituents are very much present in the mind of the writers. Those who have mastered a given idiom may exploit its formal and semantic relationships with other idioms and words in the language and even in other languages while those with an insufficient mastery will find these same relationships a source of confusion and errors.

4. AN EXAMPLE. The lexicographer is faced with the task of determining whether a given form is a variant, a stylistic modification, or an error. The following idiom, which is a frequent source of both stylistic creativity and errors, will serve to illustrate the complexity of this problem. The idiom *renvoyer qqch aux calendes grecques* means 'to postpone something indefinitely'. While *renvoyer* 'to postpone' is a commonly used verb, the noun *calendes* 'calends' meaning 'the first day of any month in the Roman calendar' (OED 318d) is rather obscure. Since the Greeks did not use calends in their reckoning of time, the adjective *grecques* 'Greek' created a humorous contradiction. The French expression is a translation of the Latin idiom *ad calendas graecas* 'at the Greek calends' meaning 'never'.

4.1. VARIANTS. This idiom has a number of verbal variants, formed with the verbs *renvoyer*: '[...], il a renvoyé aux calendes grecques la réforme des retraites, [...].' (*LM*); *envoyer*: 'N'a-t-on pas envoyé aux calendes grecques la démarche éducative qui doit présider toutes les approches pédagogiques?' (*Dev*); *remettre*: '[...] pour remettre la ratification aux calendes grecques [...].' (*LM*); *reporter*: '[...], de reporter cette ratification par les Communes aux calendes grecques, [...].' (*LM*); and *repousser*: 'M. Rabin a repoussé aux calendes grecques un projet de réforme de la loi antiterroriste.' (*LM*).

The elliptical verbal variant *renvoyer qqch aux calendes* from which the adjective *grecques* has been omitted is not found in Canadian French: 'L'objectif de Paris est [...] de renvoyer aux calendes les dossiers plus épineux.' (*LM*).

Nominal variants are formed with nouns derived from these verbs, including *renvoi* from *renvoyer*: '[...], - les islamistes ont donc obtenu le renvoi aux calendes grecques des élections législatives [...]." (*LM*); *remise* from *remettre*: '[...] pour expliquer la remise aux calendes grecques de cette décision.' (*LP*); and *report* from *reporter*: '[...] ne conduise à un report aux calendes grecques de l'adhésion de leurs pays à la CEE.' (*LM*).

These forms constitute variants because they are conventional syntagms appearing frequently in the corpus, having a lexeme in common (*calendes*) and a meaning which cannot be derived from the meaning of the individual constituents.

4.2. STYLISTIC MODIFICATIONS. The stylistic modifications of this idiom focus on the adjective *grecques* 'Greek'. Adjectives designating other national origins are used to adapt the idiom to a particular context. This may be accomplished through:

a. substitution, e.g., *belges* 'Belgian': 'Alors que l'Eurostar va parcourir le Kent à la vitesse d'un cheval au galop et que la liaison vers Liège est remise aux calendes belges, [...].' (*LM*).

b. coordination, e.g., *italiennes* 'Italian': 'Décors et costumes sont actuellement remisés au Stade (ils prendront prochainement le chemin de l'Europe) et les représentations prévues pour Toronto et Vancouver sont, pour l'instant, renvoyées aux calendes grecques... ou plutôt, italiennes.' (*LP*).

The forms cited here are not variants because they are created by an individual for a specific purpose using one of the six modification processes. They are not conventional, being single occurrences dependent on a particular context.

4.3. ERRORS. The idiom is most often used to refer to the government's postponement of projects, proposals, reforms, etc. The direct object of the verb must be an abstract noun designating a postponed item of business. In the following two examples, the error lies in the nature of the direct object:

a. a concrete noun, the Canadian flag banished from City Hall in Quebec City: 'J'aime à croire que le drapeau du Canada s'élèvera bientôt en face de l'hôtel de ville de Québec et que vous n'userez pas d'astuces, (J. Parizeau) de tergiversations, de faux-fuyants pour le reporter aux calendes grecques.' (*LS*).

b. an animate noun, an athlete who lost his position on a team: 'Steve Avery, qu'on avait relégué aux calendes grecques, devait être utilisé exclusivement en relève.' (*LS*).

The idiom refers to the postponement of something to a time in the future so distant that it will never come. In the following example, it is incorrectly made to refer to the distant past through the use of the verb *retourner* 'to return': 'Par exemple, et sans retourner aux calendes grecques, quel souvenir avez-vous de la session qui a produit *Further Definitions*.' (*Dev*).

5. CONCLUSIONS. While traditional dictionaries have long presented idioms as fixed phrases with sporadic variants, corpus-based research does not support this view. In light of the astonishing variability of many idioms such as the one examined here, it is necessary to recognize that an idiom is in fact a *network* of variants. In the case of idioms with a constituent belonging to an antonymic pair (eg. *good/bad*) or to an aspectual set (eg. *to become/to be/to remain*), it is clear that each variant is an equally necessary part of a *system*. Viewing the idiom as a fixed form and the variant as a modification thereof cannot account for this fact.

For the lexicographer seeking to identify the network of variants belonging to a single idiom, the challenge is to distinguish an idiom's phraseological variants, including the rare, the archaic and the regional, from stylistic modifications and errors. The typology developed from the analysis of a corpus of some 2,000 modern French idioms provides a basis for judging potential variants. For example, faced with a single occurrence of *de tout bord* 'of all kinds', one might hesitate to accept it as a variant of *de tous bords*. The fact that a series of similar idioms presenting the same type of morphological variability exists (*à tout crin/ à tous crins* 'diehard', *à tout venant/ à tous venants* 'to all and sundry', *de tout côté/ de tous côtés* 'from all sides', *de tout poil/ de tous poils* 'of all kinds', *en tout cas/ en tous cas* 'in any case', *en tout genre/ en tous genres* 'of all kinds') strengthens the case for *de tout bord* being a variant rather than an error. Typological studies of idioms and their variants will prove very fruitful, allowing the establishment of models of phraseological variability and ultimately the discovery of its underlying principles.

A systematic study of stylistic modifications led to the identification of the six processes used by writers as well as the various typographical conventions which signal to readers that the idiom has been modified. Again, these provide criteria for evaluating potential variants.

It is the phraseological errors that are the most problematic for the lexicographer working with a purely synchronic corpus, given that what may appear to be an error today may in fact be accepted as a variant tomorrow. This applies specifically to errors considered as such only within the context of a given idiom. The systematic study of the erroneous use of idioms will ultimately lead to the discovery of the various patterns of phraseological evolution.

Finally, by using a relational database, it was possible to study idioms not as isolated phenomena but as part of the system of the language. This approach will prove invaluable in both practical and theoretical terms, bringing about improvements in lexicography and forcing us to change the way we think about idioms.

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[1] Abbreviations used in this paper are as follows:
French press: Edj = *L'Événement du jeudi*; Lib = *Libération*; LM = *Le Monde*
Quebec press: Act = *L'Actualité*; Dev = *Le Devoir*; LD = *Le Droit*; LL = *Le Lundi*; LP = *La Presse*; LS = *Le Soleil*; Voir = *Voir*.

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PROCESSING OF SARCASTIC IRONY

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PRESENTED OUT-OF-CONTEXT, the meaning of utterances such as 'my best friend is an angel' are under-determined, though clearly not anomalous. On face, one can easily discern three plausible senses such an utterance. First, there is the literal sense, which might occur if someone was describing a friend dressed up as an angel for a Halloween party. Second, there is conventional (what Rachel Giora calls salient; see for instance Giora 1999) meaning associated with each utterance, as would be the typical metaphoric interpretation that the best friend is supportive or helpful in some way. And third, there is the ironic or sarcastic sense, which might occur if one would intend an addressee to understand the opposite of the conventional metaphoric use, i.e., that the so-called best friend is anything but.

Naturally, utterances, unless used as examples by linguists or psycho-linguists, are not encountered out-of-context and one can reasonably expect that context, be it situational or discourse, would help the addressee understand which of these various meanings was intended. And clearly discourse context is important. In previous research in my psycholinguistics laboratory, my colleagues and I have shown that a target utterance encountered in a context that is contextually inappropriate is taken as a rejection of the truth-value of the statement and produces a sense of irony whereas the exact same utterance in a contextually supportive or appropriate context is treated as an endorsement and, consequently, as a metaphor (see Katz 1996 for a review of these studies; Attardo 1999 for a discussion of the role of contextual appropriateness in irony).

Although few would quibble with the idea that context drives the processes involved in recovering speaker's intention, there is an important theoretical controversy about where and when context effects arise. In essence the controversy can be reduced to two separate views of the role of context, though there are variants of each view. These two general positions are represented both in linguistic theories and in psycholinguistic theories. At one end of the theoretical spectrum are models which claim that there are initial obligatory analyses preformed on an utterance, regardless of context. That is, some processing occurs that is context-independent. The output of these initial obligatory processes could be modified by context, but this would occur only after the initial processing had been initiated (see, as exemplars of this general position Searle 1979, Giora 1999, Dews & Winner 1995, and Colston 1997).

At the other end of the spectrum, are models that posit context can bias processing so that only context-appropriate interpretations are drawn. That is, if one has a sufficiently rich, elaborated and constrained context, the only interpretation that one will derive from the utterance is that appropriate to the context. Thus, in principle, one would initially process only the context-appropriate sense of the utterance, and, given the context, that might entail that one does not process the literal or the conventional sense of that utterance (see, for examples of this position Glucksberg, in press, Gibbs 1986, Sperber & Wilson 1995) but that, for instance, the irony of an utterance would be directly accessed on reading or otherwise encountering the sentence.

In this paper, I would like to examine one aspect of contextual information, namely the nature of the person who uttered a comment such as, in the example above, 'my best friend is an angel'. To this end, I will interpret and re-interpret data that over the past few years we have gathered in my laboratory and, in some cases, have published to make somewhat different points. What I wish to emphasize here is the *social* relationship(s) between a speaker and the audience(s) he or she is addressing. Note that a speaker and audience play various social roles: they might differ in terms of relatedness degree, from total strangers to close family members or from positions of power, such as social equals or non-equals, as occurs when one is the employer of the other. Even when the speaker and addressee are not intimates, social information might be useful, such as knowledge (or stereotypes) about gender, socio-economic status or generic knowledge about some category membership displayed by the speaker.

The two classes of theories in principle could differ on the role played by such social knowledge, but, in practice, neither have done so explicitly. On face, one should expect that proponents of the context-independent approach would argue that one would process the literal or salient meaning of the utterance, independent of social knowledge associated with the speaker; though, arguably, social knowledge later might boost the accessibility of less salient meanings. Thus, with respect to processing, social knowledge, in general, should not be apparent immediately when one encounters an utterance and will play a role in interpretation only later in the comprehension process.

Proponents of the direct-access position could argue that, in principle, social knowledge would be a factor that leads one to ignore the literal or salient meaning of the utterance for the context-supported meaning. However, to date, neither psycholinguistic nor linguistic theories have incorporated such social knowledge into their models. In fact, Relevance Theory, a major direct-access type of linguistic theory has been explicitly criticized by some (e.g., Mey and Talbot, 1988) as being asocial, and clearly it is the case that sociolinguistic factors have been scantily considered by Relevance Theorists. In any event, the theoretical position would have to hold that if sociolinguistic factors are considered in the trade-off between processing effort and contextual effect, then such factors could be evident on-line, that is at the early moments of the comprehension process

Not only are there a dearth of explicit consideration of social factors by theorists from either the direct-access or the context-independent schools of thought, a review of the literature indicates that there is a fairly limited empirical literature on the role played by social factors in the processing of indirect language in general, and in ironic language specifically. And, even when considered, most of the empirical literature has employed off-line tasks, that is, tasks in which the impact of social knowledge was measured long after the original utterance was made. For instance, Kreuz (1996) has shown that people report that they are more likely to use sarcasm with people that they are close to, compared to those that they are not close to. Analyses of conversations by Gibbs (2000) and Kotthoff (1998) demonstrate that people take into account knowledge of the persons to whom they are talking in understanding the irony of an utterance, and in fact, these social bonds often lead to a friendly bantering using embellished ironies.

These studies are valuable because they tell us whether or not specific social contextual knowledge played a role in how the utterance was interpreted. But, to my knowledge, there are no studies yet published that have explicitly examined the social dimension in the on-line processing of ironic or sarcastic utterances. Presently, I will present such a re-interpretation of some of my data to make this point. In fact, I am aware of only study that approaches an on-line examination of social knowledge in the processing of indirect language. Thomas Holtgraves (1994) manipulated speaker status and the conventionality of an indirect request in various tasks that measured the latency with which a response was made available. He observed a status by utterance conventionality effect in which the directive aspect of the unconventional indirect request was processed more rapidly when uttered by a high-status speaker (e.g., foreman) to a lower-status addressee (e.g., worker). These data are consistent with the argument that social status is taken into account relatively early in the comprehension process, especially when the utterance does not have a well-established or salient meaning. However, even these data are not conclusive in discriminating between direct access and obligatory processing models. The problem arises because the timing parameters involved in Holtgraves' tasks, such as reading a complete sentence and making a comprehension decision, or even worse, a subsequent grammaticality decision on a word string, are sufficiently long that one cannot discount the possibility that the data are due to later developing inferential processes (as suggested by initial obligatory processing models) and not to immediate and direct access of target meaning (as suggested by direct access models).

To examine the role played by social factors in the understanding of sarcastic irony, I will interpret two studies involving the processing of utterances that could be understood as either metaphor or as an ironic commentary on the metaphor. As with Holtgraves study of indirect requests, the utterances will either be familiar, and hence more likely associated with a canonical usage, or not as familiar, and hence more likely to require elaborated processing for meaning. The basic expectation is, along the lines argued by Rachel Giora (1999), the default interpretation of an utterance will be that which is most familiar, conventional or, for less familiar utterances, most easily composed. The question of interest here is whether context plays a role in the interpretive processes on-line, that is, immediately, during the act of , in my

Jan and her cousin, the priest (the comedian) were waiting in line at the supermarket checkout. The cashier was working very efficiently. About the cashier the priest (comedian) said:

'Her mind is an active volcano'

Jan and her cousin, the priest (the comedian) were waiting in line at the supermarket checkout. The cashier was having great difficulty counting change for the customer ahead of them in line. About the cashier the priest (comedian) said:

'Her mind is an active volcano'

Table 1. Sample experimental passages.

studies, reading the utterance (as suggested by direct access models) or downstream, that is, later in the processing sequence (as suggested by obligatory initial processing models).

Two types of contextual factors will be discussed here. First, the nature of the discourse will be contextually appropriate or not, thus either inviting one to believe the speaker is either endorsing or rejecting the proposition that underlies the utterance; naturally there will also be neutral comparison conditions in which there is no bias either way. The stimuli will be analogous to those described earlier, with the expectation that an endorsement leads to a metaphoric interpretation of the utterance and a rejection to an ironic interpretation.

The second factor will be one of what I wish to especially emphasize here, namely social stereotypes and other social knowledge that enters into language usage. As operationalized in this paper this factor will be represented by stereotypes about the occupation of the person who utters the target comment; this variable was chosen because occupation is among the more potent signs of social class and power. In Katz and Pexman (1997) we examined whether members of different occupation would be associated with the habitual use of different forms of indirect language, namely metaphor and sarcastic irony. Our test was simple: we presented a list of occupations to a sample of university undergraduates and asked them to rate the likelihood that members of each occupation would tend to use irony and sarcasm in everyday speech. We found, perhaps surprisingly, a high agreement in the ratings, with reliability calculated both within a sample, and cross-validated with a second sample. Examples of occupations associated with relatively high irony use but relatively low metaphor use are comedians, army sergeants, factory workers and truck drivers, and obversely, with high metaphor but low irony some examples would be: clergyman, teachers, artists, scientists.

In a second phase, we then examined whether occupational status played a role in how metaphoric or ironic a given utterance was perceived to be, using an off-line task. Our task involved presenting a set of fairly short passages. Various versions of each basic scenario were constructed, such as shown in Table 1.

As can be seen, for each scenario one of the participants made an utterance, such as 'her mind is an active volcano'. In half of the cases the utterance was familiar with a salient metaphoric meaning whereas the other half of the utterances were unfamiliar and thus did not have a well-established interpretation. These utterances were made in different discourse contexts. There were three main types of discourse contexts: one in which the utterance was context-appropriate one and hence inviting the metaphoric interpretation of the utterance (as in the upper panel of Table 1), a second in which the utterance was context-inappropriate and hence invited a neutral interpretation (lower panel) and final, neutral control condition which didn't explicitly bias towards either the metaphoric or ironic reading. For each of these three contexts the utterance was made by various people associated with either metaphoric speech (e.g., priest) or ironic speech (e.g., comedian). There was an additional neutral condition, identical to the other except that the occupation of the speaker was not identified. The participant's task was to read a set of these passages and after each one make a set of ratings as to speaker's intent; the ones most relevant here are the ratings of the degree to which the speaker was being sarcastic and the degree to which the speaker was mocking someone. Finally, after reading all the passages, and performing a distracting task, the participants were asked to recall as many of the target utterances that they could.

The critical question was whether occupational mention played a role in the interpretation of the ambiguous target statement. The answer is 'yes', as observed in both the rating and memory data. In addition to observing that in the neutral conditions, occupational mention was especially associated with degree of sarcasm and mocking, we observed that occupation interacted with utterance familiarity. For instance, an unfamiliar statement uttered by a person from a high-irony occupation (such as comedian or army sergeant) was reliably rated as more likely to be mocking someone else than was the exact same statement made by a person from a high-metaphor occupation (such as a priest) or for familiar statements, regardless of who made the utterance. I interpret these data as indicating that familiar statements are processed to their canonical meaning, especially when placed in context-appropriate conditions. However, as support for the canonical interpretation is lessened, and thus interpretive ambiguity increases, the addressee brings to bear whatever information can be marshaled to help disambiguate the intentions of the speaker, including social information that the addressees' knows about the speaker.

The recall data also indicated that information about who made an utterance is coded somewhere in the comprehension process. The memory data are exactly the same utterances made in exactly the same contexts with only factor that differed being the occupational status of the speaker. In this situation, our participants recalled from 5–10% more of the statements when made by a high-irony speaker. I take these data to indicate that various constraints, such as social factors associated with the speaker, the familiarity of an utterance and the appropriateness of the utterance to the discourse context that preceded it, all play a role, often interactively, in the perceived irony of the utterance. But recall as well that these data, as has been the general case to date, are based on off-line measures, and consequently, are non-diagnostic with respect to the critical factor that discriminates between context-driven direct access models of irony processing and models that posit an obligatory initial access of privileged literal or conventional meaning, irrespective of context. The latter class of models would explain the data above as indicating that sometime after the initial processing of privileged meaning, inferential processes had come into play that had then made use of constraints, such as occupational status.

As a first step at attempting to look at what is occurring on-line, moment-by-moment during the reading of the statements employed by Katz and Pexman. Penny Pexman, Todd Ferretti and I (Pexman et al, in press) have recently replicated the Katz and Pexman study using a moving windows procedure, a sensitive on-line reading task that mimics the natural eye movements that occur during reading and provides an ecologically valid somewhat non-obtrusive measure of processing. Of importance here it allows us to examine the processes that occur as each word in a passage was encountered by measuring the length of time that one lingers over a word. By adding a sentence after the target utterance, we were also able to measure how long one spent after reading the last word in the target before proceeding to the next sentence, and the length of time taken in reading that first word of the following sentence. Longer reading times after the sentence, compared to baseline and control conditions, indicate a 'spill-over' effect in which the processing of the utterance has not been completed.

Preliminary analysis of the reading times for each word in the utterances indicated little variations across the sentence, until the last word in the utterance was encountered, at which time reading time increased markedly. This is not surprising for two reasons. First, the increased RT for the last word a sentence is a common finding and has been taken to indicate the time required to resolve processing that was not resolved earlier in the sentence. Second, as one might recall, all the utterances used here were of the nominal metaphoric form: 'An A is (does) B', such as 'her mind is an active volcano', with the last word thus being the head noun of the metaphoric vehicle

Most theories of metaphor comprehension puts the processing load on the vehicle, and so it is *not* surprising that resolution of the metaphor requires elaborated processing of the last word of a metaphoric sentence. Consequently variability in reading time for the last word in the target sentence should in part depend on how rapidly the metaphoric usage was resolved. We were especially interested in seeing whether longer reading times would spill over to locations after the last word had been read, indicating that meaning resolution was not completed by sentence end, but was occurring downstream, i.e., later in processing. In the figures that follow, reading times for the last word in the target utterance, the time taken after reading the last word before proceeding to the next sentence, the time to read the first word

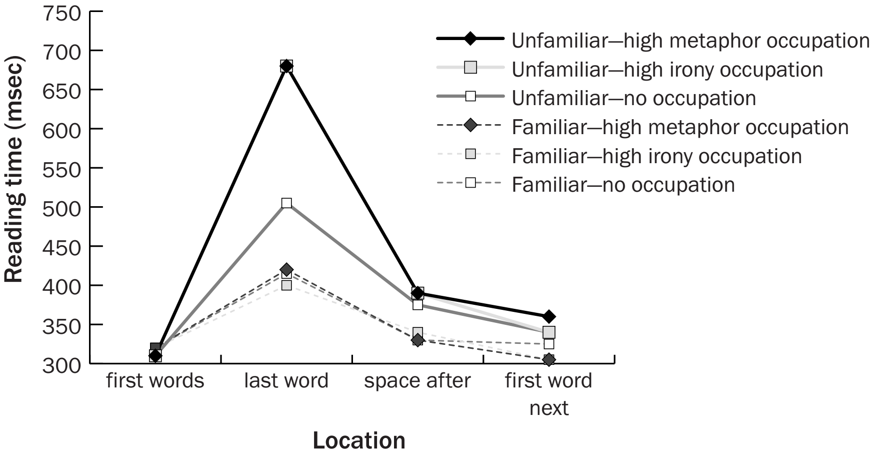

Figure 1. Reading times for familiar and unfamiliar sentences as a function of occupational mention.

of the sentence that followed the utterance and, as a baseline, the average reading time for the words in the target sentence that proceeded the last word are presented.

Two aspects of the these reading data are relevant to the issue of when social knowledge becomes available for use in the comprehension process: the role played by occupational mention, and its interaction with the various discourse contexts. The effect of mentioning speaker occupation is most unambiguously apparent in the three neutral conditions, that is, the conditions in which the context did not explicitly bias towards either the metaphoric or ironic sense of the utterance. Recall that in one version the occupation of the speaker was not mentioned, whereas in the other two conditions speaker occupation was mentioned, and was an occupation associated with either metaphor or sarcastic usage.

As can be seen in Figure 1, there is a strong effect of occupational mention for the last word in the sentence, at least for unfamiliar utterances. Thus, as in the off-line Katz and Pexman study, one finds again occupational mention is more important for unfamiliar statements than for familiar statements, when there is limited supporting discourse context. Of greatest theoretical interest is the evidence that a social factor, the occupation of a speaker, is available for use even during the reading of the utterance made by that speaker. This is evidence that a social constraint on interpretation is accessed very early in the processing sequence!

The interaction of occupational mention as a function of different discourse contexts is shown in Figure 2 (overleaf). The left panel represents the data when the speaker comes from an occupation associated with metaphoric speech and the right panel when the speaker is from an irony-high occupation. If one looks at the high-metaphor speaker panel first, one can see that reading time is less for the last word in the sentence, when speaker occupation is given, whether the discourse context

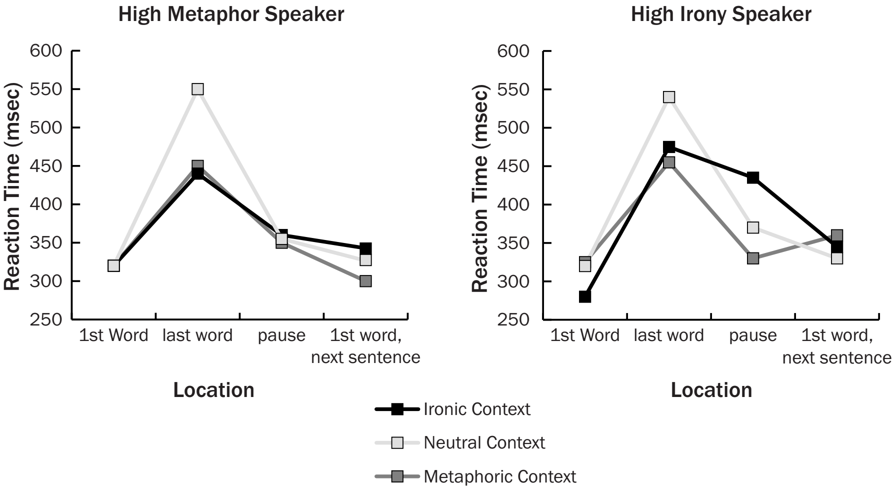

Figure 2. Reading times for high metaphor and high irony speakers as a function of different discourse contexts.

was biased towards either an ironic or a metaphoric reading. However, regardless of discourse context, participants lingered after the first word for the same period of time. That is, there is minimal spill over effect. That is, it appears that a metaphoric reading of the utterances was made by the end of the sentence, and additional interpretations were not made immediately thereafter. There is a slight suggestion, moreover, when the utterance was made in the irony-inviting context, and spoken by a high metaphor person, that a recognition of a possible incongruity was emerging as can be seen by the slight increase in reading time for the first word of the following sentence for that condition, relative to the other two. Unfortunately we did not measure further downstream so the possibility of such a 'sleeper' effect is only speculative and will require further research.

If one looks at the lower panel, which represents the exact same discourse conditions but in which the utterance is made by an irony-high person, one can see that the effects within the sentence are remarkably similar to that found with the metaphor-high speaker: that is, mentioning speaker occupation led to faster reading of the metaphor vehicle, relative to the condition in which occupation was not mentioned. However, marked differences are observed when latency is measured after the last word in the target had been read. When both the speaker is associated with ironic speech and the discourse context is biased towards an ironic reading, our participants pause 60 milliseconds longer after reading the last word of the utterance before engaging the first word of the next second than they do when the context is neutral and 100 milliseconds longer than they do when the verbal context is biased towards a metaphoric reading. That is, conjoint cues to ironic use seem to quickly elicit additional processing, arguably reflecting the recognition of irony.

To see whether our reading times are related to the subjective experience of irony, we correlated the on-line reading time data with the off-line measures from Katz and Pexman. The findings here were quite impressive: about 45% of the variance in the ratings of mocking and sarcasm are predicted by the time taken after reading the last word in the sentence before proceeding to the first word of the next sentence. That is, the degree of felt sarcasm appears to be related to processes that occur by the time one has completed reading the utterance itself. Our subsequent memory of the utterance is dissociable from these ratings and depend on processes that develop more slowly than those used in comprehension. In short, the reading time data are directly related to consciously felt sense of sarcasm, and the explicit recall of the same items.

Taken together, these data suggest that at least some forms of social knowledge is available for use extremely early in processing, at least by the end of the utterance itself. The social knowledge used here, occupational status, has been shown to play a role in disambiguating speaker's intent and, in principle, then this information could be used on-line to aid in comprehension, especially when there are few other cues available, such as the salience of the meaning associated with the utterance and the strength, or specificity of the preceding verbal context. A second finding is that social knowledge, at least speaker occupation, is a much weaker constraint than are the constraints engendered by the verbal context For instance, we find no evidence that a person associated with an ironic occupation creates problems when he or she utters an ambiguous statement in a verbal context that is biased towards the metaphoric reading. Finally, the interactive effects that we observe suggest that various constraints can work together to produce a sense of incongruity (and hence longer reading times).

In conclusion, what do these data suggest about the contrary positions given by direct-access versus initial obligatory processing models? On the one hand, familiar utterances are processed more rapidly and are less influenced by speaker occupation, findings certainly consistent with the Graded Salience version of the obligatory processing model. However, the findings also indicate that as one recognizes that an unfamiliar utterances is being encountered other sources of information quickly are marshaled to aid in the comprehension process. The interactive nature of the findings suggest to me that perhaps we would be better served by considering how we could integrate Salience and direct-access comprehension models. One possibility is that we consider models based on the weighted consideration of multiple sources of information in a somewhat continuous fashion, with familiarity or salience being only one such source.

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THE SERIAL INTERACTIVE DEBATE: WORD BLEND EVIDENCE

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There is general agreement among language production modelers that sentence generation involves several distinct processing levels related to such things as message generation, syntactic structuring and phonological encoding. A continuing question among production researchers is whether the various production processing levels are serially ordered (Garrett 1988, Levelt 1989) or interactive (Dell 1986, Stemberger 1985). The dispute centres on the relations between the various hypothesized levels. Clearly, speakers must have intended messages before they can syntactically or phonologically encode them. For instance, choice of a lexical item cannot precede choice of a message. However, is the relation feed-forward only as proponents of serial processing would claim? Or can lower level processes such as phonetic encoding affect upper level semantic or syntactic choices, for instance? Some evidence such as lexical bias and priming effects have suggested that the relations are interactive—that they go both ways, forward and backward.

This paper will address this question from the perspective of word blends, focusing particularly on lexical access. Certain properties of blends are consistent with either an interactive or serial approach, but the word frequency effect is not. The investigation here will examine the nature of the relationship between the two hypothesized processing levels of lexical access: i) the syntactic-semantic based access level—the so-called lemma level, and ii) the phonologically based level of access—the so-called lexeme level.

Word blends can be defined as the fusion of two words which are functionally synonymous in a given context. An analysis of 166 word blends provides support for the claim that word frequency effects are located at the phonological level of lexical access (Jescheniak & Levelt 1994). Only those blends which involve words which segmentally overlap such as *stated/said → stedd* are subject to this effect; blends which don't overlap such as *yes/right → yight* are not subject to this word frequency effect. Not only is this finding taken as support for the claim that there are two independent levels of lexical access, but also for the claim that these levels are serially ordered.

This paper will begin with a brief description of previous evidence supporting two levels of access, noting how the evidence relates to the serial versus interactive views on the relation between the two levels. This will be followed by a brief description of the 'substitution' analysis of blends, an approach which is required for the word frequency study. Speech errors are unintentional and usually the intended target and intruder are clearly identifiable. This is not true of blends where both words seem to be intended. As will be demonstrated, the substitution analysis of word blends allows a principled distinction between target and intruder and this in turn allows a word frequency comparison of the two. The word frequency study will be described followed by a discussion of how the frequency effects relate to serial and interactive models of access. It will be argued that they support serial models. The paper will end with some discussion of other blend characteristics and their possible implications for production models and the serial-interactive debate.

1. PREVIOUS EVIDENCE FOR TWO LEVELS OF ACCESS. Word substitutions such as the errors in (1)–(2) have been interpreted as supporting two independent levels of lexical access because the errors in (1) involve semantically, but not phonologically related words, whereas the converse is true with respect to those in (2) (Garrett 1988). Word substitutions in aphasic populations exhibit the same characteristics and, in addition, the two substitution types show distinct time courses with respect to recovery (Buckingham 1980). Hesitations also support two levels because pauses preceding form based access are filled with iconic gestures, whereas other pauses are not (Butterworth 1980). Tip of the Tongue (TOT) states in normals also point to two levels since meanings and syntactic class are retrievable, but only a few parameters relating to form can be accessed, specifically, first letters, number of syllables and stress pattern (Brown & McNeil 1966). TOT states in aphasics are similar except that even fewer form parameters are available, namely, i) first letter (Gonon et al 1989). Experiments with dementia patients found less (no) phonological information, and weaker semantic and syntactic constraints in TOT induced word substitutions. This suggested failure of lemma access in dementia and older adults, versus failure of lexeme access in younger adults (Astell & Harley 1996).

(1) *husband → wife, hate → love*
(2) *apartment → appointment, elegant → elephant*

Experiments with normal populations have also distinguished the two levels. Jescheniak and Levelt (1994) found that response times to low frequency words such as *wee* corresponded to those of their high frequency homophones such as *we*. Since these pairs only share phonological features, word frequency effects seem to be situated at the lexeme, that is, phonological level of access. Similarly, Simner and Smyth (1998) found frequency effects in response times to main clause verbs and nouns but not to their gap positions in following clauses suggesting that only the lemmas were accessed in the gap positions.

The hesitation and error data support two levels of access and have been used to support either an interactive (Dell & Reich 1981) or a serial model (Garrett 1988). The response time (RT) data, on the other hand, support serial models only. Otherwise, we would expect to find frequency effects at both levels of access. Word blends, also provide evidence for two distinct levels of access, and, as will be illustrated below, like the RT data, they too support a serial, non-interactive relation between the two levels.

2. THE SUBSTITUTION ANALYSIS OF WORD BLENDS. The traditional structural 'splice' approach to blends has been to view them as involving a sequence of two words, where WORD$_2$ completes an incomplete WORD$_1$, as in *dollars/bucks → ducks* where part of WORD$_2$, *ucks* completes the incomplete WORD$_1$ *d*. However, blends are better viewed as homologous to sublexical slips namely, anticipations, perseverations, exchanges and substitutions (Laubstein, to appear). Sublexical slips can be seen as the replacement of sub-syllabic constituents in one word by identical sub-syllabic constituents from some other word (Laubstein 1985, Dell 1986)[1]. The homologous approach to blends explains why the characteristics of sublexical slips such as sensitivity to the phoneme repetition effect, stress effects, word onset effects, etc. are also characteristic of blends. The parallel error distribution of slips and blends is particularly compelling. Chi-square comparisons of the error rates of each syllabic constituent in Laubstein blends, Fromkin blends (Fromkin 1973), and Laubstein slips confirmed that the three corpora are parallel. The syllabic constituents, onsets, nuclei and codas are similarly susceptible to error in the three corpora respectively (Laubstein 1999).

Besides accounting for the fact that sublexical slips and word blends have the same characteristics, this substitution approach i) solves problems inherent in the 'splice' approach, is ii) explanatory with respect to various other blend properties, iii) allows a single production mechanism to generate both sublexical slips and blends, and iv) allows a principled way of distinguishing the target word from the intruder. (See Laubstein, to appear, for details.)

Using the substitution approach, the target word can be identified as the word which provides all features of the word but one, including its metrical structure, foot and syllable structure and its segmental makeup. The intruder provides only one sub-syllabic constituent (or affix[2]). In the splice approach the two words could not be distinguished in this way. The errors in (3) provide details.

(3)

Target Word	**Intruder**	**Syllable—Constituent**	**Error**
pity	*shame*	onset—*sh*	*shitty*
husky	*hefty*	nucleus—*e*	*hesky*
minor	*trivial*	coda—*l*	*minal*
		Affix	
aggravates	*intensifies*	*ify*	*aggrifies*
nullifies	*negates*	*gate*	*nulligates*

It is not always clear which word is target, nor which syllabic constituent is involved because so many blends involve words which segmentally overlap such as *horrible/terrible → herrible*, and *space/spot → sposs*. Sixty-six percent of the blends analyzed here included segmental overlap. For instance, using the substitution analysis the error[3] *space/spot* → *sposs* could be a replacement of the nucleus ‘a’ in *space* or a replacement of the *coda* ‘t’ in *spot*. Similarly ambiguous, *horrible/terrible* → *herrible* could be a replacement of the onset ‘t’ by ‘h’, or of the nucleus ‘o’ by ‘e’. Of the 166 blends 117 (70%) were unambiguous blends under the substitution analysis. An unambiguous blend is an item which can be unambiguously analyzed with respect to: i) which of the two words is the chosen target and which is the intruder and ii) which syllabic constituent (or affix) is replaced. (Of course, we can never be absolutely sure as to what the actual targets and intruders are. Speakers identify the word they think has caused the error. They may be wrong. All blend corpora suffer in this way.) In order to conduct the word frequency analysis it was crucial that the target and intruder be identified and hence the analysis was limited to the unambiguous seventy percent. Of these there were only 109/117 whose member words had a frequency count in Francis and Kucera.

3. WORD FREQUENCY EFFECT. The 109 blends were divided into two groups, those with overlapping segments such as those in (4) and those with no overlap such as those in (5):

(4) *shining/sunny* →*shunny*, *hall/lobby* → *hobby*
(5) *yes/right* → *yight*, *quick/fast* → *quack*

The actual frequency of the member words were compared, not frequency classes. Only those targets which were segmentally related to their intruders were subject to a word frequency effect, others were not. 61% of the targets were more frequent in the overlapping set whereas only 27% were less frequent. This difference was significant. Goodness of fit test: $\chi^2 = 8.02$, $p<.005$. In the blends with no phonological overlap 45% percent of targets were more frequent and 45% of targets were less frequent. In both the overlapping and non-overlapping sets 11% were of equal frequency.

These data support claims that word frequency effects are found at the phonological, or lexeme level of lexical access (Jescheniak & Levelt 1994). This is the level at which a word’s phonological structure is relevant. The fact that the word frequency effect was limited to the segmentally overlapping set of blends is support for serial models. In an interactive model the effect would be expected to spread from the lexeme back to the lemma level. However there was no evidence of this.

On the other hand, at first glance word blends would seem to be the perfect evidence for interactive models since they involve the blending of two words which are functionally synonymous, and, as discussed above, at the same time they often implicate phonologically related words. Indeed, Dell and Reich's argument (Dell & Reich 1981) that word substitutions support interactive models is based on the fact that the semantically related pairs (such as those in (1) above) have a closer phonological relationship than expected by chance. Dell and Reich argue that this can only be explained if the lower level phonologically based access level is influencing the

OVERLAPPING SEGMENTS IN FIRST FOUR WORD POSITIONS	0	1	2	3	4
Semantic Substitutions (Dell & Reich, **n=130)	.61	.25	.12	.02	.00
Phonological Substitutions (Fay & Cutler n=156)	.15	.37	.24	.17	.08
Laubstein Blends (n=105)	.38	.30	.22	.07	.04
Fromkin Blends (n=61)	.16	.38	.33	.08	.05

Table 1. Overlapping segments (adapted from Garrett 1988). **Garrett mistakenly has n=137 and resulting incorrect proportions.

upper level semantic-based lemma level. In other words the two levels are not serially ordered but interactive.

Feed-forward only, serial models would not predict a higher than chance relation of phonological relations in the semantic based substitutions. However, Garrett points out that the relationship in such pairs is not nearly as close as in the phonologically related malapropisms, a property which an interactive model does not explain. Table 1, which is adapted from Garrett, illustrates the difference in the relations. Garrett compared the first four positions in each of the target and intruder words in the word pairs involved in the two types of word substitutions. He checked for overlapping segments in these four positions. For example, in the substitution *start* → *stop* three of the first four sounds are identical. (The vowels are spelled differently but implicate the same phoneme). In semantic substitutions a large proportion of the words (.61) had none of their first four segments in common whereas in the phonologically based malapropisms a much smaller proportion (.15) had no overlap in the first four serial positions. Malapropisms were also much more likely to have one, two, three or four segments in common than the semantic substitutions, as is illustrated in the second and third rows in the last four columns. As Garrrett claims, the two types of substitution seem to be distinct. However, blends, which by definition are semantically related, exhibit phonological relationships more closely related to the phonological malapropisms as illustrated in Table 1. The relations are actually closer than they appear because the metrical structure of competing words along with final sounds are often identical. For instance in the blend *terrible/horrible* → *herrible*, only two of the first four segments overlap but all the rest overlap, along with the metrical structure. This close phonological relationship, along with the inherent semantic relationship of functional synonymity, would seem to be strong support for Dell and Reich and their interactive claim.

We appear to have conflicting data; word frequency effects support serial models and the co-occurrence of semantic and phonological relations in word substitutions and blends supports interactive models. Dell and Reich argue that since the phonological relationship is higher than expected in the semantic (lemma) level substitutions, the phonological (lexeme) level must be adding activation to the semantic level choices. That is, the lemma level activates, but then is subsequently activated by, the lexeme level. The claim is that serial models fail to produce this effect because they do not allow phonological levels to affect semantic levels. However, it seems that in fact serial models can account for the data without this backwards activation.

Let us assume a serial model (Levelt 1989). To produce the two types of word substitutions it may be assumed that words activate their neighbours. Assume that a word like *stop* activates its semantic neighbour *start* at the lemma level; *stop* also activates its phonological neighbour *start* at the lexeme level. In such a case *stop* has had a double effect on *start* because it just happens to be related to it at two levels, and not just at one level like the words *hate* and *love* for instance. Now assume that *start* is also more frequent than *stop*. This gives another boost to the mis-selection possibility. What we have here is two chances of getting the incorrect *start* added to any word frequency effect that there might be. (Levelt 1989 reports a small word frequency effect in word substitutions.) Dell and Reich appear to have computed the probability of a phonological effect on semantic relatives as an intersection of probabilities ($^1/_n \times {}^1/_n = {}^1/_{n^2}$) and not as a sum. That is, they computed the probability of getting one thing twice rather than two chances of getting one thing ($2 \times {}^1/_n$)—a much larger probability. Given this different assessment of the probabilities it may be that the interaction argument loses its force. Moreover, it is clear that a serial model can produce the phonological-semantic intersection in blends and word substitutions[4]. The phonological effect is simply due to the fortuitous intersection of a sound and meaning relation in certain pairs of words like *stop* and *start* and *lobster* and *oyster*. Moreover, the weaker phonological relation in the semantic substitutions relative to the phonological malpropisms is predicted because these words have already received a level of activation from the semantic relation and would need less activation from the phonological level to reach threshold. That is, a malapropism like *appointment* → *apartment* where there is no semantic relation, would need a higher level of phonological similarity to achieve the required activation boost to reach threshold.

4. DISCUSSION. What other characteristics do blends have that might be able to inform us about production models, and specifically, their serial or interactive nature? As argued in Laubstein (to appear) the fact the characteristics of slips are shared by blends constrains production models to employing the same mechanism for the production of both types of error. However the constraint applies to, and can be incorporated equally by, serial and interactive models.

66% of word blends involve words with overlapping segments. Can this fact be used to choose between the serial and interactive models? It is clear that a serial model would predict that overlapping blends would be more frequent than non-overlapping, since words with two sources of activation (at lemma and lexeme level) would be more highly activated than words with only one source. But it also seems clear that an interactive model would predict the same thing. The extra boost from the lexeme level back to the lemma level would affect the non-overlapping pairs at the lemma level, but it would also affect the overlapping pairs. Thus it too would predict more overlapping than non-overlapping blends.

Would the two models differ with respect to predictions about the amount of meaning relatedness in the two groups of blends? That is, might the semantic relations between the words in the overlapping group be different from the relations in the non-overlapping group[5] and would either model predict this difference? A study is underway to determine whether the meaning relatedness in the two groups is evaluated differently. Subjects were asked to evaluate on a scale of 1–5 the semantic relatedness of the pairs of words in capital letters, and to indicate their choice somehow (e.g., by circling their choice). There are three different types of pairs being judged; overlapping, non-overlapping, and unrelated fillers as exemplified in (6)–(8) respectively:

(6) According to PUBLIC/POPULAR opinion, the movie's really good.
(7) You should take me with you on your next JOB/TRIP.
(8) Susan turned the PAGE/CAR before answering.

However, whatever the results of such an evaluation, it would seem that it relates not to the serial interactive dichotomy, but rather to whether words are viewed as semantically decomposed or not in either type of model. How closely related do two lemmas have to be for them to interact in a blend; and is the relationship at the lemma level, a linguistic level, or at the conceptual message level? If the level of activation of potential intruders is dependent on the number of semantic/syntactic features the intruder shares with the target we would expect overlapping blends to require fewer semantic-syntactic features in common since they would benefit from shared phonological features. But this is true of either serial or interactive models.

Word frequency effects, apparent in experiments and natural word blends, are found where phonological form is relevant, at the lexeme level, and not where semantic-syntactic features are being processed, the lemma level. These data are consistent only with serial models. In addition, the major evidence which appears to refute seriality, the phonological effect in semantic substitution errors, can in fact be generated by serial models. The serial-interactive debate continues. We can only hope that it is not another 'light is wave/light is particle' debate—simply a matter of how we observe the phenomenon.

[1] Viewing sublexical slips as segmental errors rather than syllabic constituent errors does not affect the argument here.

[2] These two so-called 'affix' errors reflect an interesting property of 'affix' errors. It is a common property of speech errors that items that replace one another are constituents of the same type. But those units that behave like affixes are problematical. For instance, in the error *chicken cooked* → *cooken chicked* the 'en' would not generally be considered an affix. Garrett has termed these pseudo-morphs. The two blend 'affix' errors in (3) appear to involve the affixal *ify* replacing and being replaced by the non-affixal *gates* and *vates*. What counts as an affix in language production is an empirical question that remains unstudied. For some discussion see Laubstein, to appear.

[3] The splice approach was similarly ambiguous. For instance, in the blend *space/spot* → *sposs* it is not clear whether the break would come after the 's' or after the 'p'.

[4] Sidney Lamb, at the LACUS XXVI meeting, suggested that since neuronal systems are interactive it is unrealistic to hypothesize a serial model. It seems clear that we have a much more richly detailed knowledge of language systems than we do of their actual neuronal underpinnings. Unfortunately we are limited to conclusions based on the data that we can examine at this time. The word frequency effect in blends support seriality. It remains an empirical question as to how this is implemented neuronally.

[5] I would like to thank Carita Paradis from Lund University for suggesting that there might be a difference in the semantic relatedness of the two groups.

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EVIDENCE FOR THE SHARED REPRESENTATION OF PART-OF-SPEECH INFORMATION

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The representation of lexical category information (e.g., noun, verb, adjective, etc.) and its influence on lexical selection was investigated. Using a priming methodology, we preceded targets which were orthographically ambiguous between nouns and verbs but phonologically distinct (e.g., *convict*) with unambiguous noun and verb primes. We found that when a noun prime preceded an ambiguous target, significantly more noun pronunciations were produced relative to when a verb prime preceded it. This result demonstrates that lexical category information influences lexical selection when a word is ambiguous for part-of-speech. This result suggests that, like form and semantic representations, the representation of category information overlaps, or is shared, across individual words in the mental lexicon. The implications of the influence of this sort of lexical organization for linguistic theories are then discussed.

1. introduction. According to a traditional view, the lexicon consists of an uninteresting, unordered repository of idiosyncratic linguistic information (Bloomfield 1933, Chomsky 1965). Over the last decade, however, the role of lexical representations has become increasingly important in both linguistics and language processing. As a result, lexical representations have become more complex and rich; linguistically significant generalizations are now often encoded within the lexemes. Additionally, several linguistic frameworks assume that sentence construction is lexically driven (cf. Chomsky 1981, Bresnan 1982, Pollard & Sag 1987, Van Valin 1993), and many processing theories assume that lexically-encoded syntactic, semantic, and phonological information plays a crucial role in sentence comprehension (cf. Frazier 1987 for a summary) and production (cf. Fromkin 1973 among others). Due, in part, to the increasing importance of the lexicon to linguistic and language processing theories, a considerable body of research focusing on how aspects of lexically-encoded information are represented and how these representations influence language processing has developed. The primary focus of this paper is on one particular aspect of lexical information, namely, the representation of lexical category information and how it serves to partially organize lexical knowledge.

Particularly detailed theories of lexical representation are laid out in Head-Driven Phrase Structure Grammar (Pollard & Sag 1987, 1994, Koenig 1999), Construction Grammar (Fillmore, Kay & O'Connor 1988, Goldberg 1995) and Cognitive Grammar (Langacker 1987, 1991). Many theoretical constructs in these

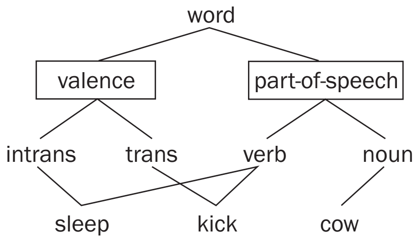

Figure 1. Partial multiple inheritance network.

theories hinge crucially on a model of the lexicon composed of hierarchically organized lexeme classes which capture generalizations characteristic of word types, such as in Figure 1. This architecture allows words which share lexical information to be linked to superordinate mother nodes from which the common information can be inherited.

Assuming a hierarchical representation of the lexicon affords these theories the ability to produce explicit representations of syntactic and semantic lexical properties. This allows for the development of robust lexicons in computational applications and captures lexical subregularities with the same mechanisms which are used to capture truly productive lexical patterns. While there are several theoretically appealing aspects to this type of organizational schema, to date little experimental evidence has been found to support such a model.

Evidence for the general hypothesis that lexical representations are linked via overlapping phonological, orthographic, and semantic information comes, in part, from studies employing priming paradigms in which the response to one word is facilitated when preceded by a word that shares some crucial feature. Priming effects have been obtained when the association between a prime and a target involves semantic association (cf. Swinney, Onifer, Prather, & Hirshkowitz 1979) or overlap in either phonological or orthographic form (cf. Tanenhaus, Flanigan, & Seidenberg 1980). There is also evidence that primes which are morphologically related to their targets facilitate responses (Kempley & Morton 1982; but see also Butterworth 1983 for an alternative interpretation of these latter results). Facilitation or priming effects are commonly interpreted as evidence of overlap in the representations of words. More specifically, these behavioral results are consistent with the general proposal that lexical entries share features that can result in priming. We chose to investigate lexical category information because, like phonological, orthographic, and semantic information, it is generally accepted to be lexically encoded. However, not all theories of the lexicon agree about how category information is encoded within the lexicon. In fact, many theories remain quite vague on this point.

Two logical possibilities for the representation of lexical category information are immediately apparent. Lexical category information could be encapsulated within each individual lexical entry. Under this hypothesis, the set of words that share only part-of-speech information, for example nouns, would not be related to each other as a function of being nouns. Each lexical entry would have its own unique and autonomous category information. Alternatively, lexical category information could be shared across lexical entries, either as an abstract category to which members of a lexical class are associated, or as a pattern of representational units that are shared by all members of a lexical class. Thus, all nouns would be linked to the same representation of part-of-speech information, or they would overlap in the portion of their representation that conveys part-of-speech information. In this paper, we test this latter hypothesis, namely that part-of-speech information is shared across lexical items.

2. BACKGROUND. While the notion of a shared representation of lexical category information is not new to linguistic theory (cf. Pollard & Sag 1987, Koenig 1999), supporting evidence for a shared representation of lexical category information in the experimental literature is scarce. The closest analog to the present research question comes from recent sentence processing research on garden path resolution. Trueswell and Kim (1998) found that preceding the ambiguous main verb in a sentence (e.g., *accepted*) with an unambiguous verb that shared only one of the subcategorization frames (e.g., *insisted*), influenced the subcategorization bias of the context verb. Specifically, the processing difficulty normally experienced when reading a sentence like (2)a could be significantly diminished when the verb prime *insist*, which subcategorizes only for an S-Complement, preceded the main verb, such as in (2)b.

(2) a. The talented photographer accepted the money was stolen. (*Processing difficulty)*
b. The talented photographer (insisted) accepted the money was stolen. (*Processing difficulty reduced*)

Trueswell and Kim's discussion of their results dealt with the implications for theories of sentence processing. However, we believe that they also provide intriguing insights into the organization of the lexicon. Note that Trueswell and Kim's primes shared neither formal nor semantic content with target verbs. What caused the less frequent subcategorization frame (the S-Comp frame) associated with the main verb to be chosen over the more frequent one (the NP frame)? The only lexically-encoded characteristic common to both prime and target which could have influenced the activation of one subcategorization frame over another is the subcategorization frame associated with the prime. Thus, we believe that this result was due to the priming of subcategory information.

The priming of subcategory information found in Trueswell and Kim suggests that the representation of subcategory information in the lexicon is not encapsulated within individual entries but rather is shared or linked across lexical entries. If correct, their results suggest that priming techniques may be useful for determining whether other types of abstract grammatical information which are hypothesized to be lexically-encoded are also shared among lexical entries.

In the upcoming experiment, we investigate the hypothesis that lexical category information is shared across lexical entries. As mentioned above, we chose to investigate the representation of lexical category information because it is generally accepted to be lexically encoded. Additionally, many words in English are ambiguous between noun and verb, such as the word *fish*. We used a subset of these words which are orthographically ambiguous but phonologically distinct, such as in (3). Unlike words like *fish*, which carry no phonologically explicit cue as to their lexical category, when an alternating word is uttered, it is unambiguously either a noun or verb.

(3)	**Word**	**Noun**	**Verb**	**Phonological Alternation**
	convict	['kanvɪkt]	[kən'vɪkt]	Primary stress shift
	use	[jus]	[juz]	Final consonant voicing alternation
	delegate	['deləgʌt]	['deləgeʲt]	Secondary stress shift and vowel quality

Note that the word *convict* has initial stress when it is a noun but final stress when it is a verb. In similar fashion, *use* has a voiceless final consonant when it is a noun but a voiced final consonant when a verb. For words of this subset, before a speaker can name the word she must make a decision about its lexical category. Thus, pronunciation reveals which part-of-speech was selected by a speaker.

We hypothesized that if lexical category information is shared across individual lexical entries then it should be primeable, i.e., the presentation of an unambiguous noun or verb prime should influence the category bias of individual ambiguous words. In other words, by preceding zero-derived verbs with unambiguous nouns and verbs, speakers' lexical selection biases can be affected, causing them to produce more noun or verb pronunciations than they would in an unbiased condition. By comparing speakers' pronunciations of ambiguous words, we can identify whether the presentation of an unambiguous prime has any effect on lexical ambiguity resolution.

3. METHOD

3.1. PARTICIPANTS. Forty-five undergraduates from the University at Buffalo received partial course credit for their participation.

3.2 MATERIALS. Thirty targets that were ambiguous between noun and verb were paired with unambiguous noun, verb, and letter primes that shared neither orthographic, phonological nor semantic content. A sample item set is provided in Table 1. The majority of the targets alternated between a noun and verb by shifting the placement of the stress (e.g., CONDUCT, REBEL, RECORD). However, a few words had either a voicing alternation (e.g., USE, EXCUSE, ABUSE) or a vowel alternation that was independent of stress (e.g., WIND, DOVE). Additionally, a few of the noun/verb pairs were not morphologically related; their ambiguity is accidental

	Noun Prime	Verb Prime	Letter Prime
Primes	CHILD	WRITE	F
Targets	USE	USE	USE

Table 1. Noun, verb and letter primes paired with an ambiguous target word.

(e.g., WIND, DOVE, DESERT). Targets were matched for frequency of occurrence as nouns or verbs (Francis & Kucera 1982); we expected them to be equibiased in the control condition.

Noun and verb prime pairs (e.g., CHILD and SEND) were matched for degree of imageability (Coltheart 1981). Also, the majority of our primes were monosyllables (e.g., ROB, BLESS, CAT, DINE, BOOTH, etc.), so the stress pattern of the prime should not have influenced participants pronunciations. The letter control condition was included to provide a neutral baseline. These consisted of single letters (e.g., T, D, J, F) that participants were instructed to name.

Prime and target pairs were counter-balanced across three presentation lists. Ninety distractor items, consisting of primes and targets that were either letters, prepositions, adjectives, or adverbs were also included. Distractor primes and targets were never optionally a noun or verb.

3.3. PROCEDURE. Primes and targets were presented sequentially with an interstimulus interval of 500 ms. to allow participants time to finish pronouncing the primes. Words were centered on the computer screen in capital letters, with targets appearing two lines below where the prime had been displayed. Participants were instructed to read both primes and targets aloud as quickly as possible. Participant trials were recorded and the recordings were then scored by two raters. There was a 94% agreement in category classification across raters.

4. RESULTS. There were 1350 total responses of which 139 were excluded from the analysis. Of these, 82 responses were discarded due to rater disagreement[1]. An additional 57 responses were discarded because the part-of-speech was indeterminable due either to background noise or mispronunciations by the participant (i.e., not one of the acceptable pronunciations for the target word). Thus, 1211 analyzable responses remained. Since the percentage of noun and verb pronunciations are complements of each other, they provide identical information. The analyses were computed on the mean percentages of noun pronunciations tabulated across subjects and items.

Table 2 shows the mean percentage of noun pronunciations and standard errors for the three priming conditions. The control, letter prime, condition elicited an intermediate proportion of noun pronunciations, suggesting that the ambiguous targets were, in fact, equibiased and that the letter condition did not influence part-of-speech selection. Significantly more noun pronunciations were produced following the unambiguous noun primes than following verb or letter primes. While

Noun Primes	**Verb Primes**	**Letter Primes**
58% (.26)	48% (.25)	51% (.28)

Table 2. Percentage of noun responses (and standard errors) following noun, verb, and letter primes.

there were numerically fewer noun pronunciations (and therefore more verb pronunciations) following verb primes than following letter controls, this was not a significant difference.

5. DISCUSSION. The results of this study show that noun category information can influence the process of lexical selection for words that are ambiguous for part-of-speech information. These results provide initial support for the hypothesis that lexical entries are organized, in part, in terms of lexical category information. In the context of activation models, if the activation of noun category information was not spreading from the lexical representation of the prime to the representation of the target, then we would not have expected to find a difference between the noun prime and letter prime conditions. The unambiguous noun primes biased each individual target word because the shared part-of-speech representation was already partially activated. This resulted in the production of more nouns when following a noun prime than when following verb primes or letter controls.

The fact that we did not obtain a symmetrical result for verb primes initially might be taken to suggest that the category verb may not be represented across all members of the class. However, it seems improbable that the nature of the representation of noun and verb category information would vary so greatly. Instead, the lack of significant priming for verb category information in the current experiment is more plausibly accounted for by the fact that the category verb is morphosyntactically more complex than the category noun.

In English, verbs vary morphosyntactically on many more dimensions than nouns, such as transitivity, tense, voice, etc. Thus, more syntactic information is shared across all nouns than is shared across all verbs[2]. This results in nouns having more representational overlap than verbs, since the noun category does not have the same degree of internal morphosyntactic complexity as the verb category. Put another way, if lexical information is hierarchically organized, then activation from an individual verb entry to the superordinate representation of verb category information is mediated by the intermediate representation for subcategory, number, tense, etc. There may be stronger, more direct, links from lexical entries to grammatical information that is subordinate to lexical category information than there are to the superordinate verb category representations. The strongest priming effects would thus be expected not when verb primes and targets share category information but rather when they share some subordinate property, such as subcategory information. This is consistent with what was found by Trueswell and Kim

(1998). Thus, a hierarchical organization of lexical information would be more likely to produce priming effects for nouns than verbs.

More broadly, our noun results are similar to Trueswell and Kim's subcategory results. Specifically, in their study, the prior activation of one subcategorization frame strongly associated with a rapidly presented prime made the primed subcategorization frame much more accessible to the subsequent ambiguous verb in sentence context, thus reducing processing difficulties. While the current study used a different methodology, the mechanism underlying these results is similar, i.e., spreading activation across shared, linked, or distributed representations.

An alternative explanation for the present finding is that priming is driven not by shared part-of-speech information but rather by shared semantic properties, namely that nouns share the semantic property of denoting objects. This proposal, while not what we initially intended, is interesting in its own right in that it instantiates a particularly abstract notion of semantics. Primes and targets are semantically more similar when they share the same part-of-speech. Thus, the fact that a noun prime denotes an object might bias participants to conceptualize the target as an object as well. In other words, the semantic representation of object associated with the prime could have been activated, thus facilitating the access of the *object* semantic representation associated with the target. This alternative still relies on the notion of priming an abstract subportion of the representation of target words.

A possible explanation for the asymmetry of priming effects between our noun and verb categories under this interpretation may be that the semantic notion *object* is more conceptually salient than the semantic notion *event*. Saliency may play a role in the magnitude of a semantic priming effect. Further research must be conducted in order to tease apart the semantic and syntactic competing interpretations.

6. CONCLUSION. This study provides preliminary evidence that sublexical properties other than form and semantic similarity can serve as organizing principles within the lexicon. We have shown that lexical category information can be primed by a preceding word that shared only part-of-speech information and was dissimilar in other features acknowledged to be organizing characteristics in the lexicon. These priming results support the hypothesis that lexical category information is an organizing factor within the lexicon.

This result is consistent with some linguistic theories of the lexicon. For example, Head-driven Phrase Structure Grammar (Pollard & Sag 1987, Koenig 1999) Cognitive Grammar (Langacker 1987, 1991) and Construction Grammar (Fillmore, Kay & O'Connor 1988, Goldberg 1995) all assume some variant of a hierarchically organized lexicon in which lexical items are organized into a type-inheritance hierarchy. Under this model all nouns are subordinate to a noun node from which they receive all characteristics common to nouns via the inheritance of properties. This inheritance view of category information is consistent with the current results. By contrast, any linguistic theory that assumes encapsulated representations for part-of-speech without adding links between words of the same category is inconsistent with the present finding.

This result also maps onto activation models of the lexicon in which lexical representations are either localist but connected together via excitatory links or distributed patterns of activation across a network. While we do not believe that the current results help to distinguish between two such models, they do contribute to our overall understanding of the organization of the lexicon in that they provide evidence, together with Trueswell and Kim (1998), for an expanded set of lexical properties that seem to be organizing principles.

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[1] Rater disagreement was often due to an unclear pronunciation by the participant (i.e., conflicting acoustic cues such as stress and vowel quality). However, there were some items which had less clear contrasts between the noun and verb pronunciations (e.g., IMPORT and DISCHARGE). The raters had some difficulty in identifying the intended category for these words, which occasionally resulted in disagreement.

[2] Here, we are referring to syntactic, not semantic factors. Semantic dimensions on which both verbs and nouns can vary, but which do not affect their syntactic behavior, are not relevant to the lexical category distinction which we investigate in this paper. We also do not mean to suggest that nouns are inherently less syntactically complex than verbs, but rather that English makes fewer morpho-syntactic contrasts within the set of nouns than within the set of verbs. Naturally, in a language which marks case, gender, number, animacy, or abstractness, this claim would not hold.

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CONNOTATION AS A FACTOR IN LEXICAL CHOICE IN MEDIA COVERAGE OF THE YUGOSLAVIAN CIVIL WAR

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The present investigation reviews usage patterns of words used to designate the same type of referent, but which differ in connotation, in Time Magazine coverage of the Yugoslavian civil war of 1991–1995, including the conflicts in Croatia and Bosnia. The language of media coverage has been a common topic of discourse analysis studies, and is the main data for the emerging subfield of 'critical linguistics' (Hodge & Kress 1993, Fowler 1994). Studies of the news have considered the influence on interpretation of presenting information from selected points of view, choosing particular syntactic structures to foreground or background information, activating stereotypes, and so forth. The present study focuses on the area of lexical choice in the description of wartime events.

The language of war coverage offers interesting data for lexical study, as the parties involved are motivated to present events in a particular light, and their different points of view are reflected in the media record. The Vietnam war in particular is associated with a wealth of euphemisms and other examples of misleading language (Bolinger 1973, Farb 1993, Bryson 1994). It is interesting to study the role of linguistic strategies in a mainstream newsmagazine like *Time*, which can be expected to use appropriate expressions because of its mission to inform. At the same time, in presenting the views of the different factions involved, as well as those of particular writing staff, its coverage offers examples of how specific expressions may be selected because of their potential to persuade.

In this study it is assumed that patterns where particular lexical items are favored or disfavored in different contexts indicate an intentional selection of vocabulary. In some cases, a specific expression may be preferred because it is the one that most accurately conveys the information. Thus, the crime officially recognized by the U.N. is called *genocide*, not *ethnic cleansing*. However, accuracy is not essential for every context. Thus a word that generally communicates the information may be selected because it conveys or avoids a particular impression; e.g., the contrast between more neutral *detention center* and more shocking *death camp*. Finally, stylistic considerations affect vocabulary usage. Thus, a passage about *ethnic cleansing* may extend the metaphor introducing a new expression conveying a different sense. For example, the expression *ethnic purification* suggests that ethnic/racial superiority might be an issue.

Connotations, the mental associations that words carry, emerge as an important factor in lexical choice and interpretation. Thus, a euphemism or more neutral expression may be preferred to avoid the unpleasant or undesirable connotations of an alternative expression; or a qualifier supplied in order to clarify the usage of an expression typically understood in a particular way. Choosing an alternative expression can introduce new connotations into the discussion.

1. CORPUS AND METHODOLOGY. This study builds on the preliminary investigation reported in Tsiang-Starcevic 1998, which reviewed some interesting lexical usages occurring in *Time*'s reporting of the early years (1991–1993) of the Yugoslavian civil war. The corpus studied here includes all texts (333 total) from *Time* magazine whose main focus is Yugoslavia from the years 1991–1995, covering the period from the outbreak of hostilities through the signing of the Dayton Accord, a kind of peace agreement. This includes full-length articles as well as short reports, interviews, essays, and staff editorials, but not letters to the editor. Supplemental material reviewed for background and contrast included articles about more general topics such as the political situation in Europe, and articles about the contemporaneous ethnic conflict in Rwanda (30 total).

The analysis focuses on usage patterns for three groups of related expressions associated with prominent topics in the coverage. These include: (1) expressions used to describe the expulsion or killing of minority populations (e.g., *ethnic cleansing* or *genocide*), (2) expressions used to describe where wartime detainees were interned (e.g., *detention camps* or *concentration camps*), and (3) expressions used to designate the ethnic groups and subgroups involved in the conflict. The usage of specific expressions or their alternatives was considered in relation to the type of context in which they occurred. Characteristics of the context included linguistic features of the immediately surrounding text, e.g., presence of an antecedent, as well as the source and chronology of the material. Other contextual characteristics included the point of view represented when it was clear enough, and the rhetorical style of the text, for example, whether it was a news summary or an essay. The distribution patterns of the selected expressions are summarized in the following sections.

2. *ETHNIC CLEANSING*, *GENOCIDE*, AND RELATED EXPRESSIONS.

2.1. *ETHNIC CLEANSING* VS. *GENOCIDE*. *Ethnic cleansing* is clearly the hallmark term of the conflict, called by journalists Silber and Little 'the enduring lexicographical legacy of the Yugoslav war' (1997). Though *Time* describes it as originally a Nazi term (9/14/92), the expression came into general and frequent usage during the Yugoslavian civil war and reference sources date its entry into English as 1991 or 1992 (Oxford 1997, Webster's 1998). According to Bryson (1994), the coinage can be traced to Russian observers of that conflict, and Oxford (1997) notes that the term *cleansing*, used in expressions like 'social cleansing' before the Yugoslav conflict, comes from German *Reinigung* or Serbo-Croatian *čiśčenje*. Thus, it is an expression from the time and place of the war and so is naturally strongly associated with it.

Oxford (1997) defines *ethnic cleansing* as 'the mass expulsion or extermination of people from a minority ethnic or religious group within a certain area', and similar characterizations can be found in *Time* and elsewhere (8/10/92, RH 1998, Webster's 1998). The expression is used in *Time* to describe situations extending from fear-mongering and intimidation, to job dismissal, to wartime casualties, to alleged systematic execution. Because of this broad range of application, *ethnic cleansing* contrasts with the comparable expression *genocide*, defined in the OED (1989) as 'the deliberate and systematic extermination of an ethnic or national group' and closely associated with the mass murder of Jews, and others, by the Nazis during World War II. The word *genocide* was coined during this time (Greek *genos* 'race', Latin *cide* 'killing'), and is an official term for the crimes for which Nazi leaders were tried (Grolier 1997, OED 1989). Thus *ethnic cleansing* and *genocide* both overlap and contrast in interpretation. While the expression *ethnic cleansing* is applicable to situations where inhabitants flee their homes as well as situations where inhabitants are killed, *genocide* is naturally the most suitable expression for cases of the latter type, given its morphology and historical association[1].

In the corpus, exclusive domains for *genocide* include contexts where the crime originally recognized as *genocide* is discussed. Thus 'genocide' appears in reference to the events of World War II when the Nazi-supported Independent State of Croatia carried out mass exterminations of Serbs, Jews, and Romany people at the Jasenovac concentration camp, and in passages expressing the viewpoint that an analogous 'genocide' is being repeated (8/19/91, 12/14/92). When the detention camp/concentration camp story breaks, the obvious parallels to World War II raise the question of whether 'genocide' is taking place again (8/17/92). As *genocide* is a particularly shocking word, it can be found in direct quotations when it could be expected to achieve a dramatic effect. For example, State Department employee Stephen Walker explains of his resignation, 'I thought the U.S. was becoming party to genocide' (9/6/93). Finally, *genocide* occurs in more abstract language, for example, in collocations like 'fear of genocide' and 'the story of genocide' (6/20/94, 10/3/94).

Conspicuously, *genocide* is not used in descriptions of actual events of the war[2]. Rather, it is *ethnic cleansing* that is routinely used to describe the expulsions, killings and preceding intimidation that characterized the war, as in descriptions like: 'These Muslims were expelled by Serbs who had earlier been ethnically cleansed from Muslim-held territory' (12/18/95). Like *genocide*, *ethnic cleansing* occurs as well in general discussion, e.g., in reference to the 'policies of ethnic cleansing' or 'practice of "ethnic cleansing"' (1/25/93, 8/10/92).

That *genocide* is avoided in the language of events reporting can be explained as the hesitancy of writers to casually employ a term with a precise legal definition, while there is nothing to prevent its usage in more general language or as a rhetorical device. Because of its all-purpose range of application covering acts from intimidation to mass murder, *ethnic cleansing* is a suitable expression for describing a variety of situations and it must be convenient for reporting on situations whose particular details are not fully known.

2.2 *ETHNIC CLEANSING* VS. '*ETHNIC CLEANSING*'. Another pair of lexical alternatives occurring in the coverage is '*ethnic cleansing*' in quotes vs. *ethnic cleansing* without quotes. To some extent, the pattern is predictable. The phrase first appears, in quotes, in *Time's* 6/8/92 issue. Unquoted appearances begin to occur regularly in 1993 articles, and both quoted and unquoted versions occur, even in the same article (e.g., 2/22/93), during 1993, 1994, and 1995. The pattern where quotation marks are used to indicate a new expression, and then gradually abandoned as the expression catches on, is a familiar one. However, since the quotation marks around '*ethnic cleansing*' are so enduring, they may be serving to mark more than new word status.

For example, the conspicuous demarcation may serve to highlight and in a sense promote a special term, that is, the catchword of the conflict. Or, the quotation marks may be used to indicate euphemism. The expression has been identified as a euphemism for the killing or expulsion of a people (8/10/92, Oxford 1995); or, more bluntly, for *genocide* (Riggins 1997). However, rather than long continuing to function as a polite and acceptable expression, the conventional role of euphemisms, *ethnic cleansing* seems to have quickly picked up negative connotations[3]. Thus Radovan Karadzic, leader of the Bosnian Serbs, would rather describe his men's activities as 'ethnic shifting' (8/24/92). So the quotes may in fact be serving to provide distance from a distasteful expression.

Yet *Time* must certainly use the expression, since this is the way that people are talking about the war. *Time* refers to it as a 'prevailing euphemism' when it characterizes the term early in the coverage (8/10/92). However, the persistence of the quotation marks even during the later years of the war indicates a hesitancy in fully adopting the term. Indicative of its controversiality is that an official Red Cross document avoids the expression completely, talking instead about 'a policy of forced population transfers carried out on a massive scale and marked by systematic use of brutality' (8/24/92). As the expression *ethnic cleansing* may be misleading or offensive, quotes to be read as 'so-called' function to make the term easier to use.

We can consider the function or functions of quotation marks for *ethnic cleansing* in contrast to the more easily identified motivation for the use of quotation marks around the labels *safe haven* or *safe area*, the terms used to designate special areas in Yugoslavia assigned U.N. protection intended to safeguard besieged populations and refugees. It turned out that so-designated areas were violently overtaken in quick succession with little U.N. resistance. The regular occurrence of these labels in phrases like 'supposed "safe areas"' or 'U.N.-designated "safe haven"' clearly conveys the function of the quotation marks in indicating an official term that is at the same time an inappropriate one (6/5/95, 9/25/95).

2.3. STYLISTIC MOTIVATIONS AND RELATED EXPRESSIONS. While *ethnic cleansing* and *genocide* are the main expressions used in *Time* to talk about the expulsions, killings, and takeover of territory that occurred during the war, other expressions are used as well in the discussion of the same kinds of events, e.g., terms like *pogrom* and *ethnic purge*, phrases like 'enforced ethnic homogeneity' and 'countrywide eviction order', and even extended descriptions like 'tens of thousands of people being shot, slaughtered and burned just because of their nationality'[4].

Of course, lexical variation is important even in news reports to create texts that are engaging because of their style. But at the same time, an alternative expression can introduce new shades of meaning into the discussion. Thus, it is no surprise to find *pogrom* with its religious connotations, rather than *ethnic cleansing*, used in passages where the topic of the different religions of the warring factions is in focus[5]. In some cases of metaphoric extension, connotations may be introduced that are even quite different than those normally associated with the source expression. Thus variations on the theme of *ethnic cleansing* resulting in expressions like *ethnically clean*, *ethnic purification*, *ethnically pure*, and *ethnic pollution* activate the Nazi parallel and suggest that the notion of ethnic/racial purity or superiority may be a factor in the situation[6].

3. DETENTION CAMPS, CONCENTRATION CAMPS, AND RELATED EXPRESSIONS. The main expressions used to label the places where people were interned by the opposing sides during the war are: *detention center*, *detention camp*, *concentration camp*, and *death camp*. Among these alternatives *detention center* and *detention camp* certainly carry the most positive connotations. *Detention center* is the most benevolent expression, the word *center* suggesting some kind of official building in general, e.g., a detention center for young offenders. The U.S. facility in Guantanamo Bay where Haitian refugees stay while petitioning for immigration is called a *detention camp* (8/17/92). Neither term immediately brings to mind images of starvation, torture, or extermination.

On the other hand, the labels *concentration camp* and *death camp*, like *genocide*, carry extremely negative connotations because of their association with the Holocaust. While the term *concentration camp* was actually first used in Boer War times, this is the well-known term used to describe the Nazi prison and slave labor camps like Dachau. Camps like Auschwitz and Treblinka, where the mass exterminations were carried out, became known as *death camps*, while in popular usage, it seems Nazi camps in general are often referred to as *concentration camps*[7].

3.1. DETENTION CENTER AND DEATH CAMP. The usage patterns of the least offensive and most shocking among the alternatives are fairly clear. The term *death camp* occurs in a headline about 'reports of death camps' when the story about the internment camps is first reported (8/17/92). It is used again in an article about wartime rape in general which focuses on events believed to have occurred during the Yugoslav conflict: 'The fighting has opened a door upon horrors—the wanton siege of Sarajevo, the death camps and other atrocities of "ethnic cleansing"' (2/22/93). However, this article appears in the *Behavior* section of *Time* rather than in one of its news sections, and so may be less constrained in its use of language.

Detention center is the neutral term and predictably it occurs in careful language. Thus it can be found in the official language of the U.N. Security Council: 'the council demanded that all authorities in the former Yugoslavia open their detention centers for international inspection', while the word *camp* is used in *Time*'s commentary in the following line: 'This measure is also toothless, threatening no action if camp guards refuse to open the gates' (8/24/92). We can find the same pattern repeated in another article, where *detention center* is used in the first and second mention, but *detention camp* in the third (8/30/93). That everyone is aware of the euphemism is illuminated in the passage: 'In 1992 outsiders caught a glimpse of facilities like the outdoor jail, called a detention center, at Trnopolje' (5/22/95).

3.2. *DETENTION CAMP* AND *CONCENTRATION CAMP*. While the usage patterns of *ethnic cleansing* and *genocide* showed a complementary distribution, with *ethnic cleansing* used to describe the actual wartime events and *genocide* used in the language of general or dramatic statements, both *detention camp* and *concentration camp* are routinely used in reports on what was happening in Yugoslavia. In this case, there appears to have been no hesitancy in using the stronger expression with its Holocaust association. Thus, an accused war criminal is identified as a 'concentration-camp commander', the camp at Manjaca is called 'Manjaca concentration camp', and we can find passages like 'Washington is sitting on intelligence estimates that indicate 70,000 people … are being held under intolerable conditions in concentration camps in Bosnia and Serbia' and 'Nevertheless, it was the Serbs who set up concentration camps for Muslims'[8].

4. DESIGNATION OF ETHNIC GROUPS. Ethnic labels are typically fertile ground for investigations of connotation and lexical choice. However, in *Time*'s coverage of a war involving several ethnic groups and their subsets, the usage of group names appears to be fairly straightforward. Thus, *ethnic Serbs* referred to those of Serbian heritage whether they lived in Serbia, Bosnia, or Croatia. When relevant, the Serbs of Serbia were distinguished from Serbs living in other republics, who were called *Bosnian Serbs* or *Croatian Serbs*. While 'the Serbs' certainly got a bad reputation during the war, the actions of minority Serbian populations in Croatia and Bosnia, the actions of Serbs from Serbia, and the actions of Serbs in the military and in paramilitary organizations, seemed clearly distinguished in *Time*.

Absurdities were avoided such as considering the Muslims to be ethnic Serbs or Croats because that was their ethnicity prior to the 15th-19th century, when they converted to the religion of their Ottoman occupiers. Moreover helpful clarifications were supplied when the situation of ethnic composition was more complex. Thus the Bosnian government might be referred to as 'Bosnia's Slavic Muslim-led government' or the Yugoslav National Army described as the 'heavily Serb-officered federal military', as some members of different ethnic groups belonged to these organizations (2/8/93, 9/30/91). However, in a few instances, the designation of ethnic groups does raise some interesting issues concerning connotation and lexical alternatives.

4.1. RELIGIOUS CONNOTATIONS. Among the three warring factions, Serbs, Croats, and Muslims, only the label *Muslim* by itself carries a religious connotation as well, while it must be explained that Serbs are historically Orthodox Christians and Croats historically Catholic. In fact *Muslim* was recognized as an official nationality of Yugoslavia in 1974, explaining the usage of this term to designate an ethnic group which is not a majority in any republic and so not associated with a particular placename (Glenny 1993). The rather liberal style of Bosnia's Muslims compared to those of traditional Islamic countries is explained in detail in *Time*, with one article focusing on the subject[9]. Overall *Time*'s coverage makes little of the religious issue, though it reports on the promotion of the religious issue in the propaganda of the different factions (e.g., 8/24/92). That the Bosnian Muslims are called *Bosnians* rather then *Muslims*, particularly when the fighting in Bosnia intensifies in the later years of the war reflects the view that the war can be understood as one between armies, the Muslims belonging to the Bosnian one.

4.2. QUALIFIERS AS EXPLANATORY DEVICES. The usage of the qualifiers *Slavic* and *Orthodox* as common bonds linking different subgroups displays interesting patterns as well. While the early coverage refers to the three main ethnicities involved in the conflict as *Serbs*, *Croats*, and *Muslims*, at the end of 1991 we begin to find expressions like 'Slavic Muslims' and 'Muslim Slavs' (9/30/91, 4/27/92), while later plain *Muslim* occurs, alternating with *Bosnian*. It appears that the notation of *Slavic* has been added to prevent activation of general stereotypes about Muslims, e.g., that they are fanatical Arabic fundamentalists compared to more comprehensible Europeans (Said 1981, Karim 1997). The additional information may have been intended as well as an aid to the curious who may wonder what non-immigrant Muslims are doing in the middle of Europe. But as a side effect, this addition doubtless served to make Bosnian Muslims a more sympathetic group to European and North American *Time* readers.

It is interesting to notice that the Russians, traditional allies of the Serbs, are often labeled as *Slavic* or *Orthodox* as a kind of explanation of a natural bond between the two groups. Thus we find the Russians referred to as 'fellow Slavs and Orthodox Christians' and 'fellow Orthodox Slavs' (2/21/94, 2/28/94). As the religious factor is downplayed in the coverage in relation to the ethnic one, and the Muslims also receive the label *Slavic*, it appears that *Time* considers ethnic labeling important in reporting an ethnic war. Thus, Turkey's support of Bosnian Muslims is explained in terms of a special relationship between neighbors who are both 'fellow Europeans and Muslims' (9/7/92).

5. DISCUSSION. Looking at coverage as varied as *Time*'s, including texts written by a variety of authors in a variety of styles, it is tempting to focus on individual examples as indicative of a particular approach to the news reporting. However, a more accurate assessment of the coverage can be gained by considering the general usage patterns across the texts comprising the coverage over the duration of the war.

Looking at the overlapping and differential usage of the alternative lexical items investigated in the current study, the following observations about *Time*'s reporting can be made.

In the first place, the Yugoslavian conflict is reported as an ethnic war. Thus the events of the war are characterized as acts of ethnic cleansing, and detainees are interned in concentration camps. Ethnic labels are important for characterizing the participants. This focus is in contrast to the alternative of reporting the war as a religious war. Thus Muslims can be called Bosnians as well, and qualifiers like Christian or Catholic or Orthodox are hardly used to distinguish the three main warring factions. And it is in contrast to the alternative of reporting the war as a war about territory, an interpretation that heavy usage of the term *ethnic cleansing* obscures with its emphasis on what happens to people. Thus it appears that annihilating those who belong to another ethnic group is the goal, not taking or maintaining control of their land.

It is also interesting to consider how news coverage may follow a rhetorical theme. For example, it appears that the expression *ethnic cleansing* has become the way to talk about Yugoslavia in particular. Though the term occurs occasionally in *Time*'s coverage of the concurrent civil war between the Hutu and Tutsi ethnic groups in Rwanda (1994–1995; 5/16/94, 4/10/95), the expression *genocide* is more common in descriptions of that war. We can find *ethnic cleansing* brought into service again when Yugoslavia re-enters the news. *Time*'s coverage of the war in Kosovo (1998–1999), the subsequent ethnic conflict in the region involving Serbs and Kosovar Albanians, employs the term frequently, though the circumstances of that war are rather different[10]. For example, the 10% or so of Kosovar Serbs and their supporters are considered the 'ethnic cleansers', while the other 90% of Kosovo's inhabitants constitute a majority population in the region. In conclusion, this review of the Yugoslavia coverage points to a variety of issues concerning the role of connotation and rhetorical factors in media presentation that would certainly be of great interest to explore further.

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[1] See Novick 1999 on the historical associations of Holocaust terms.

[2] Two exceptions can be found. One article notes that violations of the Geneva conventions on genocide have been documented in Bosnia (6/20/94). Another suggests that NATO might get tougher with the 'genocidal hostage-taking Serbs' (6/12/95). In the first case, it is the topic of the crime that explains the usage, while the second case may represent the reporter's stylistic flourish.

[3] See further on euphemism in Enright 1985.

[4] 8/21/95, 8/31/92, 6/8/92, 8/24/92, 1/20/92.

[5] 8/17/92, 9/7/92. Pogrom (Russian *pogrom*) is the term that was used to describe the organized massacres of Jews that took place in Russia around the turn of the century (OED 1989).

[6] 5/24/93, 8/28/95, 3/16/92, 2/22/93.

[7] Details of the various types of internment camps and their historical associations are described in the 8/17/92 article 'A Lexicon of Horrors.'

[8] 12/28/92, 6/6/94, 1/11/93, 12/18/95.

[9] 8/24/92, 9/7/92 'Allah Wept.'

[10] See Tsiang-Starcevic 1999 on the usage of the term *ethnic cleansing* in contexts other than the Yugoslavian civil war (1991–1995).

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